THE PAPER INDUSTRY and PAPER WORLD

AUGUST, 1941 — VOLUME 23 — NUMBER 5

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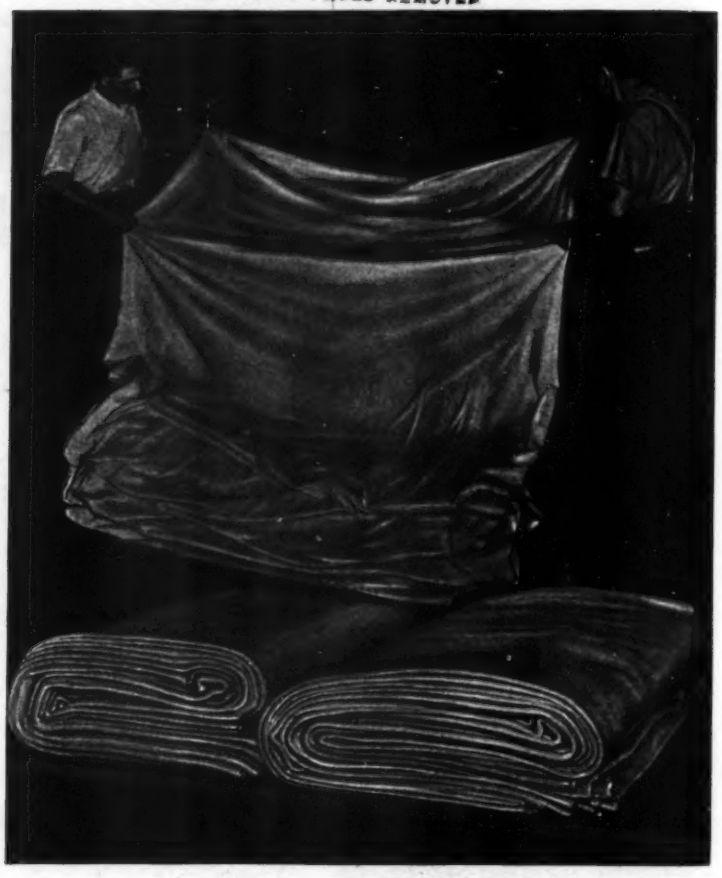
Maybe *Your* Felts cost more than you think



THE TRUE COST of any wet-end felt is measured by the value of the paper produced on it — not by the price you pay for it. Tonnage is conditioned upon continuous speed of the paper machine. Slow drying, stops for adjustment and breaks in the sheet mean just so much less tonnage — so much added to the cost of the felt. • By removing more water Hamilton Felts enable the operator to run the machine faster with less time out for adjustments and much less broke. They give better formation to the paper, reduce fuel consumption, and increase the amount and value of the production. Experienced paper manufacturers insist that Hamilton Felts are the least costly.

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• Established 1858 •

Views on Paper Shortage

These items, expressing views from prominent men in the industry, were received following publication on July 21 of OPM's prediction of a paper shortage.
—EDITOR'S NOTE

"INDUSTRY CAN MEET NATION'S DEMAND"—Hayward

American pulp and paper industries will be able to meet the nation's demand for the coming year—contingent upon satisfactory transportation, availability of materials and co-operation within the field itself, in the opinion of Ralph A. Hayward, president of the Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich., and chairman of the Pulp and Paper Industries Advisory Committee for the National Defense Commission.

Mr. Hayward expressed this belief in an address given July 29 before the Kalamazoo Kiwanis club. The speaker also declared that the pulp and paper industry should be considered a primary defense industry, with the government taking from 20 to 25 per cent of the entire output. As an example of the use of paper in defense, he pointed out that 35 tons of blueprint paper is used for plans in construction of a battleship.

The committee of which Mr. Hayward is chairman made a study and found that the nation's pulp-paper industry could produce 18,000,000 tons of paper at capacity production, approximately the maximum demand as estimated by the Office of Production Management.

◆

TINKER THINKS INDUSTRY CAN MEET DEMANDS

"The Paper Industry has capacity to produce sufficient paper to cover any reasonable estimated demands," said E. W. Tinker, executive secretary of the American Paper and Pulp Association, in reply to Washington reports of a possible shortage of various grades of paper. "Temporary shortages in certain grades may be expected to develop from time to time, but even this can be avoided to a great extent if converters and consumers will avoid placing orders in excess of their actual requirements.

"Even today many mills are not operating at full capacity, and it is believed that an operating ratio of 103 per cent for the balance of the next six months would produce some 10 per cent more paper than was produced in the first six months. The announced operating ratios are based on six-day capacities, not on seven-day operation. The total production for the first six months of the year was 60,000 tons above the estimated requirements, though the average rate of operation was only 93.4 per cent of rated capacity."

◆

APPROACHING PULP SHORTAGE IS FORECAST

Earlier forecasts of a pulp shortage now appear to be approaching reality, not only in unbleached sulphite but in other grades as well, according to Ossian Anderson, president, Puget Sound Pulp & Timber Company, Bellingham, Washington.

"Wood pulp of all grades in storage in the United States declined to 80,000 tons on June 1, 1941," Mr. Anderson said, "which compares with the March, 1940, high of 325,000 tons and with the last previous low of 215,000 tons in 1939."

Domestic demand exceeding supply of unbleached sulphite pulp this year in the amount of 300,000 tons is foreseen by Mr. Anderson on the basis of present rates of production and consumption. He quotes the OPM as estimating this year's domestic demand at 1,604,000 tons, with production and imports for the first quarter of 1941 at an annual rate around 1,300,000 tons.

"Even assuming this year's production is stepped up to the highest rate of any of the first four months, and imports for the year average up to the best month of the first quarter, unbleached sulphite pulp available for domestic consumption would still reach only 1,465,000 tons, or 139,000 tons short of estimated demand," Mr. Anderson declared.

◆

ADVISORY COMMITTEE BEING FORMED BY OPM

An advisory committee is being formed by the Office of Production Management to represent the paper and pulp industry in co-operating with OPM for national defense. The committee will consist of three sub-groups: the paper and pulp producers; the converters; and the graphic arts. Twelve representative manufacturers will represent the paper and pulp manufacturers, and a similar number each of the other groups. From this group a central committee will be selected to represent all three elements. The OPM will select the committee members, based on nominations from the industry. In addition to the Advisory Committee five sub-committees will be selected, to cover chemicals, wood pulp, power and fuel, transportation and pulpwood.

A study is under way by OPM to pave the way for any action which may be necessary to meet a feared shortage of transportation facilities for the shipment particularly of newsprint pulpwood and pulp from Canada to the United States. There is already a shortage of ships for water transportation of these commodities, and every effort

will be made to prevent a dangerous congestion.

Washington authorities are announcing that the chlorine shortage, due to the demand for this chemical for defense purposes, may result in a change in the character of book and other papers. This situation is already under consideration by the paper industry, but the announcement by the OPM is the first general knowledge of the problem given to the public.

The OPM is endeavoring to increase the collection and use of waste paper, and hopes that 6,200,000 tons can be made available this year, as against a normal 4,500,000 tons.

◆

EXTEND WASTEPAPER CEILING 60 DAYS

Consumers of wastepaper, received notice dated July 30 signed by Leon Henderson, Administrator, that at a meeting of a group of wastepaper dealers held in Washington, D. C., on July 25, 1941, with representatives of the Office of Price Administration and Civilian Supply, it was decided to continue in effect for a period of 60 days from August 1, 1941, prices on certain grades of paper stock which were the basis of an earlier agreement.

The first agreement was entered into on June 18, 1941, by individual members of the trade and the Office of Price Administration and Civilian Supply. At that time it was agreed that the ceiling prices of three grades of wastepaper would be those prices which prevailed on June 16, 1941, and that these prices would not be exceeded for a period ending August 1, 1941. For example, the ceiling prices at New York and Chicago would be as follows:

	Per short ton
At New York:	
No. 1 mixed paper	$11.50
No. 1 baled news	13.00
Used corrugated boxes	16.50
At Chicago:	
No. 1 mixed paper	13.00
No. 1 baled news	15.00
Used corrugated boxes	16.00

It is necessary not to exceed these prices in order to stabilize a situation which can get out of control because of the increased demand for paper stock. Unless the wastepaper market is stabilized, conditions will become chaotic and producers and consumers alike will suffer.

Co-operation of consumers of wastepaper is sought in maintaining the ceilings covered by the agreement. To this end it is requested that reports be made to the Office of Price Administration and Civilian Supply of any offer in excess of these prices.

No action has been taken on higher grades of waste paper, but it is imperative that the prices of these grades be stabilized immediately. Therefore, until a field investigation can be made, it is requested that dealers not exceed the prices at which they sold f.o.b. loaded on cars or trucks during the week ending July 26, 1941, any grade of wastepaper other than the No. 1 Mixed Paper, No. 1 Baled News, and Used Corrugated Boxes. Prices on the latter three grades were stabilized by a voluntary agreement at a meeting on June 18, and later extended until October 1, 1941.

◆

WISCONSIN MILLS CONSIDER THE USE OF NATURAL GAS

Early last month, members of the state public service commission held a hearing at Madison, Wisconsin, to consider the possibility of introducing natural gas into the State.

A prominent speaker at this meeting was J. Earl Bryan, general traffic manager of the Wisconsin Paper & Pulp Manufacturers Traffic Association. In behalf of the twenty paper mills belonging to this association, Mr. Bryan stated they would be interested in the use of natural gas if by so doing they could cut manufacturing costs. He stated that mills in southern Wisconsin had made a study which showed the cost of using gas and oil would be one-third the cost of using coal.

Mr. Bryan further stated that 50 per cent of the mills in the State, producing between 35 and 40 per cent of the total output of paper, would be affected by the introduction of natural gas.

◆

FINANCIAL

Paper mill securities have shared in the upturn in prices in the various securities markets. Despite heavy allocations for future tax payments, earnings reports continue at high levels.

Champion Paper and Fiber Company—Net profit for the year ending April 27 was $2,379,660, as against $1,731,937 for the preceding year.

Gair Company, Robert—and United States subsidiaries report for the six months ended June 30, 1941, profit, after depreciation, interest and dividends of subsidiary company, and reserve for federal income taxes but before interest on incomes notes, of $586,411.41.

Hinde and Dauch Paper Company—Earnings for the first half of 1941 are about 20 per cent above the net for the same period in 1940, and the total sales were 30 per cent higher, exceeding the previous peak in 1937.

Keyes Fibre Company—Net earnings for the half year were $143,749, as against $120,246 for the same period in 1940.

Masonite Corporation—Net profits for the quarter ending May 31 were $534,592, as against $333,566 for the similar period in the previous year.

Mead Corporation—Net profit for twelve weeks ending June 14 was $404,321, as against $324,020 for the similar period in 1940.

Puget Sound Pulp and Timber Company—Net profit for the first half year was $650,000, as against $618,000 for the first half of 1940.

Tomahawk Kraft Paper Company—Net profit for the fiscal year ending May 31 was $269,929, as against $90,135 in the previous fiscal year.

New York Stock Exchange—Stocks

	Closing Prices July 25	June 25
A. P. W. Paper Co.	*1½–1⅞	*1–1¼
Celotex	9¼	9½
Same Preferred	*67¾–69¾	69¾
Certain-Teed	3⅜	*3–3½
Same Preferred	*32⅞–33⅞	29⅞
Champion P. & F. Co.	21¼	19
Same Preferred	103½	*102½–104½
Container Corp.	16	16
Cont. Diamond	9	*8–8⅛
Crown Zellerbach	14¼	12⅜
Same Preferred	*86½–87½	*85½–87
Dixie-Vortex	*8–9	*7½–8½
Same "A"	35	34–34½
Robert Gair	2⅛	1⅞
Same Preferred	10⅜	9¾
Gaylord Container	*11¾–11⅞	*10⅛–10⅞
Same Preferred	*50–52¼	*52¾–53¾
Internat'nal P. & P. Co.	17¾	14⅝
Same Preferred	67	65½
MacAndrews & Forbes	25⅞	*27–28
Masonite	*24–24½	*22–22½
Mead Corp.	8⅞	*7¾–8¾
Same Preferred	*79¼–83	*75½–82
Paraffine Co.	*30½–30⅞	*28–29½
Same Preferred	*101–102	*98¾–100½
Rayonier	15⅛	12½
Same Preferred	*28⅛–28¾	*24¾–25½
Scott Paper	36	*34½–35⅝
Same 4½% Pfd.	112⅜	*112½–115
Same 4% Preferred	*110¼–111½	*109–110
Sutherland Paper	22	18⅞
Union Bag & Paper	11⅞	11
U. S. Gypsum	61	59
Same Preferred	175½	*175–175½

New York Stock Exchange—Bonds

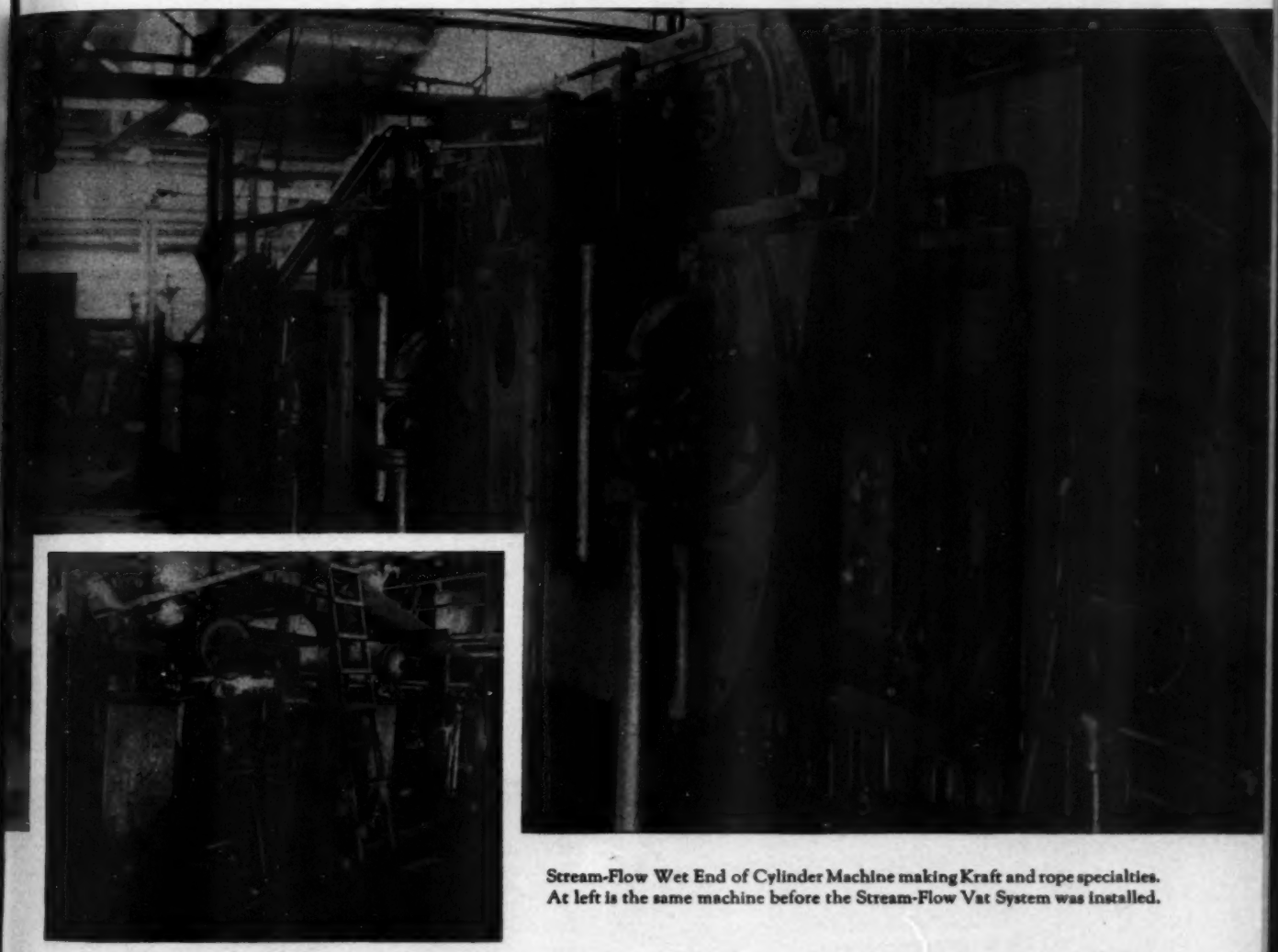
Abitibi 5%	.....	54¾
Celotex 4½%	.....	96⅝
Certain-Teed 5½%	87½	86
Champion P. & F. Co.	.....	104¼
Inter. P. & P. Co. 5%	.....	104¼
Same 6%	105	104⅜

New York Curb Exchange—Stocks

Am. Boxboard	*5⅛–6⅛	*4½–4¾
Brown Co. Preferred	*19½–19	16½–17
Great Northern	*37¼–38	*35⅜–36¾
Hummel-Ross	*5⅜–6⅛	5⅛
Nat. Container	*12⅛–12⅜	*10¾–11
St. Regis	2⅛	2
Taggart	3⅛	*2⅛–2⅜
United Wall Paper	1¼	1¼

*Closing Bid and Asked Prices.

FOOLPROOF FORMATION
with *"Stream-Flow"* Vat Systems



Stream-Flow Wet End of Cylinder Machine making Kraft and rope specialties. At left is the same machine before the Stream-Flow Vat System was installed.

The old makes way for the new . . . Again Stream Flow Systems break the formation bottle-neck and a mill making Kraft and rope specialties increases production on their most difficult grades up to 33% with greatly improved quality.

Prior to the installation of the Stream Flow Vat System, this cylinder machine was limited by formation much below dryer capacity. It now operates at full driving and dryer capacity, the driving speed is being doubled and the number of dryers increased 50% to take further advantage of the increased forming capacity of the Stream Flow Wet End.

Every day Stream Flow Vat Systems are proving their ability to give higher speeds, better formation, safer operation and greater profits . . . *Actually it is almost impossible to make a poor formation with Stream Flow Vat Systems* . . . Write us for further particulars.

A sheet is no better than its formation

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-making Machinery. Wilmington, Del.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

U. S. 1940 MACH'Y IMPORTS LOWER

A decline of 48 per cent in the industrial machinery imported into the United States in 1940 as compared to 1939 was recently announced by the Department of Commerce in Washington. In 1939 the total imports under this classification amounted to $7,893,152, while in 1940 the amount was cut to $4,125,661.

The most important single factor contributing to this drastic decrease was the falling off of trade with Germany, which country was the principal supplier of this type of equipment. In dollars, the United States imported from Germany a total of $3,639,354 in 1939 as against $175,335 in 1940.

This type of equipment imported from other countries showed practically no change, some of the figures are as follows: United Kingdom, $2,026,879 in contrast to $2,052,203 in 1939; in 1940, the U. S. imported from Sweden, $635,454; Switzerland, $633,792; Canada, $289,010; and France, $114,845. Among the many different types of machinery listed under this classification, a total of $124,411 in pulp and paper machinery was included.

PAPER TESTING LABORATORIES PROVE VALUABLE ASSET

The growth of technical research and its value in almost every kind of business is constantly being observed. Technical supervision is no longer limited to production—it also has become a valuable aid to wise purchasing.

In the paper manufacturing plants, trial and error methods long ago were superseded by technical supervision, but the value of scientific control did not stop with the making of the paper, for now many companies—even in the allied fields—use scientific tests to determine the proper papers to buy for specific uses.

One of the largest, modern paper testing laboratories maintained by such a company is found in the Reynolds Research Corporation plant at South Kearny, New Jersey. Hundreds of types of paper and cardboard go into the products of the Reynolds Metals Company for wrappings for cigarettes, candy bars and gum, bottle labels, and in packing food commodities.

Due to the wide variety of papers used, many different tests are given. The instruments used include the following well-known makes, some of which are seen in the accompanying illustrations: Gurley densometer, Williams Smoothness tester, Gurley stiffness tester, Elmendorf tearing tester, Cady automatic micrometer, and Thwing basis weight scale.

The laboratory is maintained at a fixed temperature and humidity, and is lighted by fluorescent lamps. J. L. Renehan, Reynolds paper expert, is in charge.

SOUTHERN KRAFT PAPER CORPORATION

Southern Kraft Paper Corporation was organized June 2, 1941. At that time all of its stock was owned by Southern Kraft Corporation. Southern Kraft Corporation was, however, merged into International Paper Company June 23, 1941, so that the latter is now the holder of the stock of Southern Kraft Corporation.

On June 9, 1941, Southern Kraft Paper Corporation acquired from Southern Kraft Corporation the paper towel and tissue mills at York Haven, Pennsylvania, and Marinette, Wisconsin, and the jute board mills at Spring Garden, Pennsylvania; Hartford City, Indiana; Rockford, Illinois; and Cincinnati, Ohio; together with minor miscellaneous properties. Southern Kraft Paper Corporation is not itself currently operating any mills, as all the above-mentioned mills have been leased to International Paper Company.

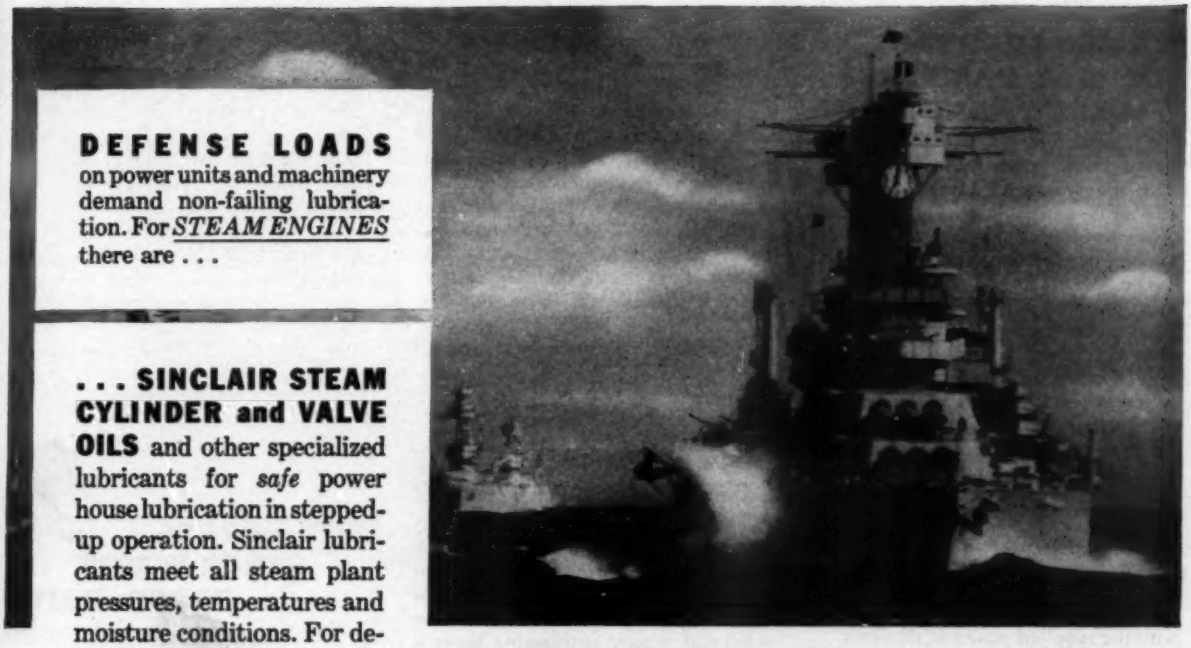
◆

WIS. FORESTS NEED FIRE PROTECTION

H. W. Mackenzie, Wisconsin State Conservation director, told a meeting of Wisconsin Conservation Congress members, held at Madison in July, that the State's forests were threatened with difficulties in maintaining fire protection through the loss of three CCC camps and possible loss of three more.

He stated that it might become urgently necessary to employ other men to prevent and stop fires.

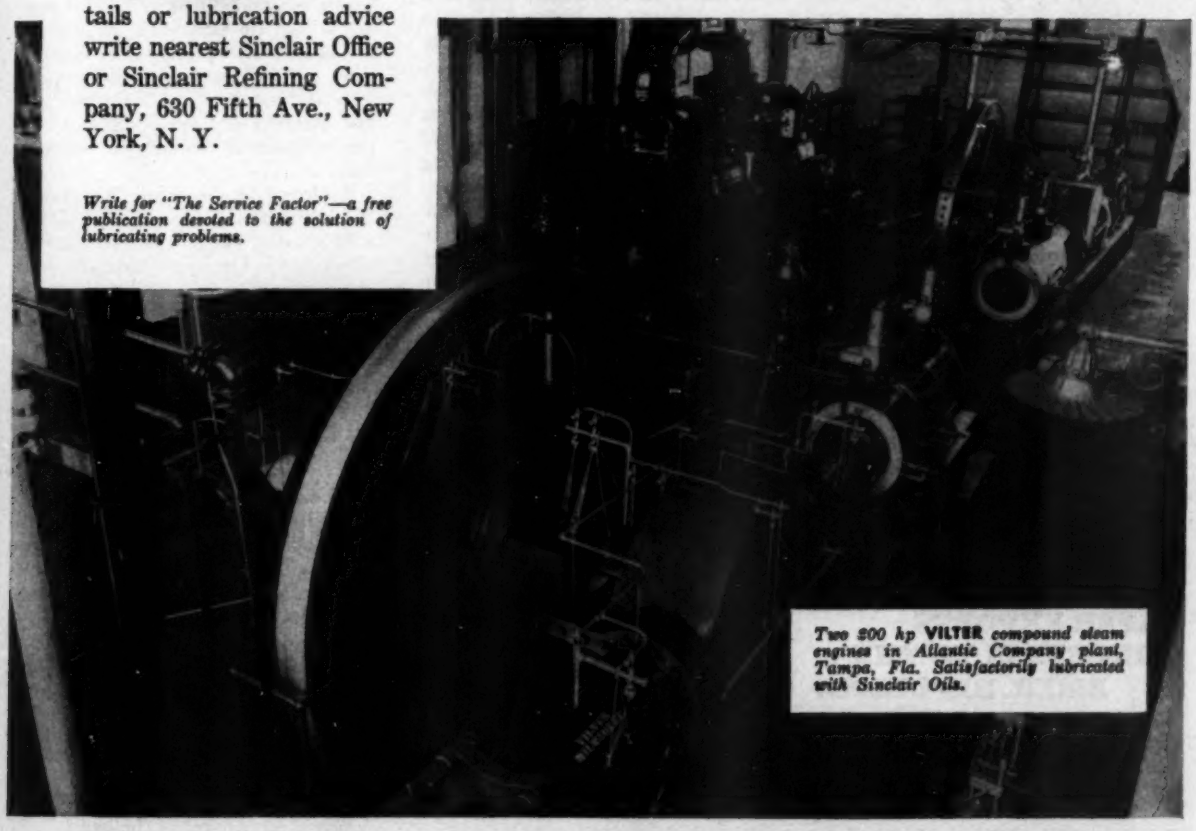
At the left is a general view of the paper testing laboratory of Reynolds Research Corporation; while at the right is a close-up of one side of the laboratory showing some of the instruments used.



DEFENSE LOADS on power units and machinery demand non-failing lubrication. For *STEAM ENGINES* there are . . .

. . . SINCLAIR STEAM CYLINDER and VALVE OILS and other specialized lubricants for *safe* power house lubrication in stepped-up operation. Sinclair lubricants meet all steam plant pressures, temperatures and moisture conditions. For details or lubrication advice write nearest Sinclair Office or Sinclair Refining Company, 630 Fifth Ave., New York, N. Y.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



Two 200 hp **VILTER** *compound steam engines in Atlantic Company plant, Tampa, Fla. Satisfactorily lubricated with Sinclair Oils.*

SINCLAIR INDUSTRIAL OILS

SINCLAIR REFINING COMPANY (Inc.)

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WATER SHORTAGE IN WIS. HAMPERS MILLS' PRODUCTION

A special meeting of paper-mill engineers and power plant operators from the Wisconsin River valley was held at Wausau, July 10, to discuss a serious shortage of water which is hampering operations this summer.

The shortage of last winter's snow, coupled with the lack of rainfall this summer, has forced paper mills to curtail production, and to operate Sundays in some cases, to take advantage of all the water released by the river.

Upper reservoirs are said to contain only 68 per cent of their capacity and a computation showed rainfall for June was only 52 per cent of normal.

The flow of surplus water from the reservoirs should by some means be controlled, it is felt, to insure that the mills along the river will be supplied with the required power at all times.

◆

GLATFELTER CO. ISSUES VOL. II ON PAPERMAKING

The P. H. Glatfelter Company, Spring Grove, Pennsylvania, has just published a booklet designated as Volume II, entitled *Paper and its Performance*. This second publication is a sequel to Volume I, issued in October, 1939, "A Short Course in Paper Making."

The first volume took up the story of papermaking from the woods operation to the finished product, but the subject was treated mostly from the standpoint of procedure, as this first volume was really a part of the complete book, *Seventy-five Years of Paper Making*, which was put out by the company on its seventy-fifth anniversary.

In Volume II just issued, the story of papermaking is told in more detail. Each kind of pulp is described and pulp preparation is outlined step by step. The reader is then taken to the paper machine, and the formation of the sheet, drying, and finishing is followed in a very understandable, nontechnical style. All of this material is graphically illustrated with fine pictures, photomicrographs, etc. The booklet is extensively indexed for reference purposes, and from the first cover to the colophon the story of "Paper and its Performance" is well told.

◆

SEEK NEW SOURCES RAW MATERIAL 9-PT CORRUGATING PAPER

The demand for corrugating material for fiber containers is causing consumers of 9-point corrugating paper to seek for new sources for their raw material, but the Customs officials have ruled that 9-point corrugating paper is not as such to be permitted entry to the United States at the low rate of duty provided for 9-point straw. Two possibilities for the meeting of the demand for 9-point corrugating paper are reported by the Import Committee of the American Paper Industry as having come before the Customs officials.

Bogus paper, containing groundwood, claimed by importers to be dutiable at 25 per cent as wrapping paper, believed by Customs officials to be dutiable as paper not specially provided for at 30 per cent.

Customs officials are investigating possible classification of corrugating stock of bagasse, claimed by importer to be dutiable as 9-point straw at 15 per cent. Customs officials are inclined to believe that material should be classified at 30 per cent as paper not specially provided for.

Jacquard board from Canada, claimed dutiable as paper board at 10 per cent has been classified for duty at 30 per cent as paper not specially provided for.

Several protests have been abandoned in the United States Customs Court by importers. Three cases in which embossed printing paper had been claimed dutiable as printing paper at ¼ cent per pound and 10 per cent have been dropped. The paper was classified as a surface decorated paper at 4½ cents per pound and 20 per cent.

In five cases, cloth-backed parchment, classified at 5 cents per pound and 17 per cent ad valorem, had been claimed to be dutiable as parchment paper at 3 cents per pound and 15 per cent.

◆

BOY SCOUTS STAGE WASTE PAPER DRIVE

Because of a drive started before any action was announced in Washington, the village of Greendale, Wisconsin, was able to answer the OPM management call for waste paper by immediately turning two tons of paper and five hundred and ten pounds of rags into commercial channels for reclamation.

Collected by Greendale Boy Scouts, the initial batch of paper was sold to a Milwaukee waste paper company for about $25. The money realized from the campaign was turned over to the Boy Scouts to finance summer camping trips.

◆

SEE FURTHER REDUCTION IN USE OF CHLORINE

The issuance of a general preference order by the OPM Division of Priorities doubtless will mean a reduction of chlorine used by the pulp and paper industry, a materially larger reduction than the voluntary 10 per cent already in effect.

The new order means that all defense requirements for chlorine will be met before any allocation will be permitted for civilian industries. Various estimates are that this will involve a further reduction in the amount used in the pulp and paper industry to as much as 35 per cent of the normal consumption, or a reduction of an additional 25 per cent.

The manner in which this situation will be met by the industry means that the industry as a whole must necessarily give the subject intensive technical study, supplemented by similar effort on the part of individual grade groups.

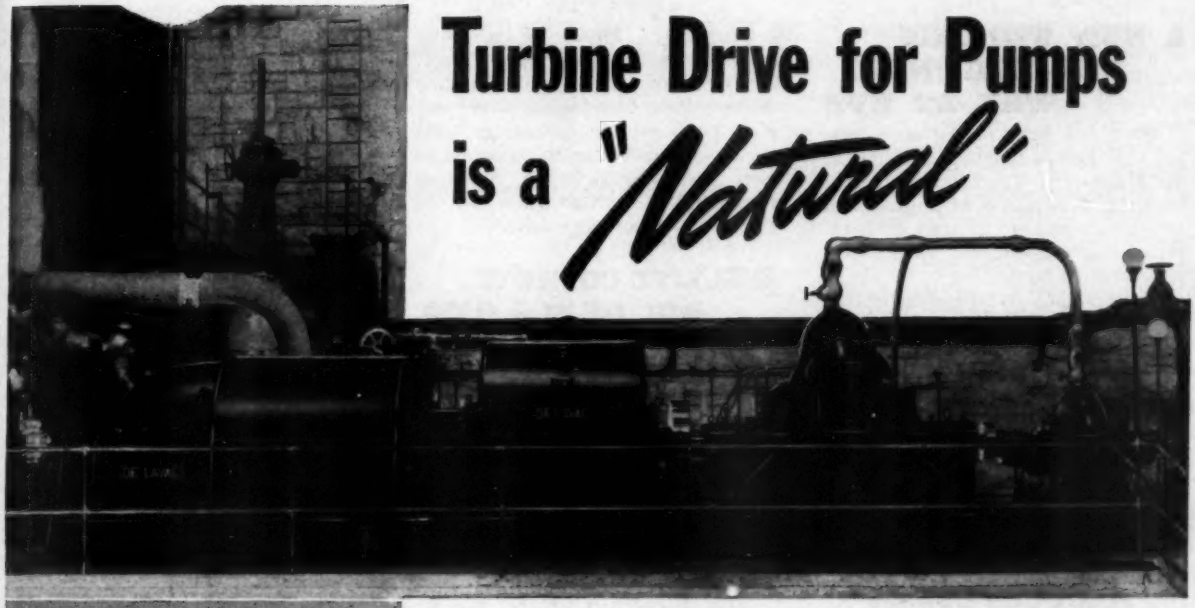
PAPER EXPORTS INCREASE TO THE AMER. REPUBLICS

In the July 19 issue of the *Foreign Commerce Weekly* it was stated that the American Republics are looking to the United States and Canada for their supply of paper and paper materials since the European markets have clogged up. The following table shows how the exports of paper and paper materials from the United States to these areas have increased:

Value in thousands of dollars

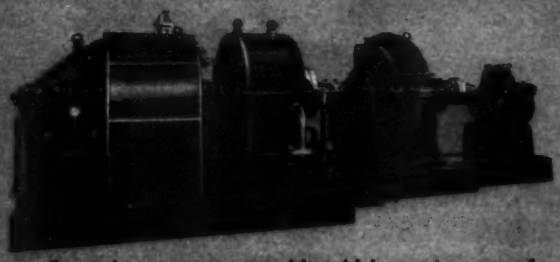
Item	1938	1939	1940
Paper and paper materials	$7,728	$10,755	$22,668
Wood pulp	213	940	5,484
Newsprint and uncoated	.....	1,104	.....
Book paper	716	.....	3,004
Greaseproof and waterproof paper	856	1,086	1,350
Wrapping paper, including kraft	778	806	2,385
Tissue and crepe paper	319	343	1,016
Writing paper, plain	905	1,279	2,615

Turbine Drive for Pumps is a "Natural"



Geared pressure-stage turbine driving water works pump; 80 m.g.d. against 187 ft. head, using steam at 175 psi. and 533°F. This unit developed a duty of 222.8 million foot pounds per 1,000 lb. of steam, as corrected to contract conditions.

Velocity-stage turbine driving boiler-feed pump; 1,000 g.p.m. against 807 ft. head at 3,500 r.p.m.



Geared pressure-stage turbine driving main pump of 30,000 g.p.m. capacity against 148 ft. head and condenser circulating pump of 1,300 g.p.m. against 40 ft. head.

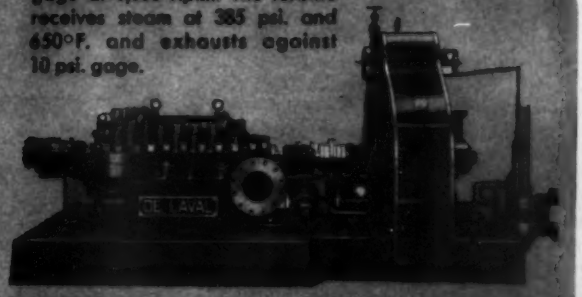
THE speed of steam turbine driven pumps can readily be controlled, either automatically or manually, to supply just the desired head and flow, thereby avoiding the great waste of power incurred in throttling motor-driven pumps to meet head and flow requirements.

Large centrifugal pumps driven through speed reducing gears by De Laval multistage condensing turbines develop high duties, and are free from the transmission charges, losses and interruptions of service inseparable from motor drives.

De Laval velocity-staged turbines exhausting to feed heaters or to process show similarly high economies and are most sturdy and reliable drives for power plant or process pumps.

State your conditions and ask for Publication T-3525.

Velocity-stage turbine driving six-stage boiler feeder; 850 g.p.m. of 220°F. water against 1,600 psi. gage at 3,550 r.p.m. The turbine receives steam at 385 psi. and 650°F. and exhausts against 10 psi. gage.



DE LAVAL *Steam Turbine Co.*
TRENTON, N. J.

MANUFACTURERS OF TURBINES STEAM HYDRAULIC PUMPS CENTRIFUGAL PROPELLER ROTARY DISPLACEMENT MOTOR-MOUNTED MIXED-FLOW CLOGLESS SELF-PRIMING CENTRIFUGAL BLOWERS and COMPRESSORS GEARS WORM HELICAL FLEXIBLE COUPLING

ADVERTISING PAGES REMOVED

A NEW STORAGE BUILDING UNDER WAY AT KVP

Work has been started on a new $65,000 storage-shipping building at the Kalamazoo Vegetable Parchment Company, Kalamazoo, Michigan. With satisfactory delivery of steel, it is expected that the structure will be completed before winter.

The building, to be erected in connection with Mill No. 2, will measure about 100 by 350 ft. The concrete and brick one-story structure will contain two large rooms. In addition to actual construction, at a cost of $65,000, the company also will improve the surrounding grounds and pave the street leading to the building.

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CAN. INDUSTRY REDUCES USE OF CHLORINE 10%

At the request of the Department of Munitions and Supply, Canada's pulp and paper industry has reduced its consumption of chlorine by 10 per cent. This move does not affect newsprint or dissolving pulps used in the manufacture of rayon yarns, Cellophane, plastics, and allied products. In particular, it will apply to all bleached pulps made for export and to pulps used in magazine, book, writing, and other fine papers.

The order went into effect on June 23, and the amount of reduction was determined by the average consumption during the six months ended May 31, last.

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UNUSUAL SALES RECORD FOR THE PAPER DICTIONARY

Just one year after its publication, *The Dictionary of Paper* has recorded a distribution that is record-breaking. It will be remembered that this dictionary was published by the American Paper and Pulp Association, and that it was three years in work. The compilation of this very extensive work was carried on through the Association's Committee on Classification and Definitions and The Institute of Paper Chemistry.

The dictionary has been distributed into all but four of the states and the District of Columbia. Copies have gone to Hawaii and the Philippines, and, notwithstanding the war, orders were received from more than twenty-five countries prior to some of those countries being affected by the world struggle.

Originally, 5,000 copies were printed and 3,000 bound for sale. Nearly all of the books in that first offering have been disposed of, and it is predicted the remaining 2,000 copies will soon have to be bound to meet the demand. The American Paper and Pulp Association will be able to fill any orders received.

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INSULITE CO. NOW DIV. OF M & O CO.

In line with recent developments in the affairs of the Minnesota and Ontario Paper Company, Minneapolis, a new setup in its corporate structure became effective July 25 when that company absorbed The Insulite Company operations. Under this new organization, all activities of The Insulite Company hereafter will be carried on by the Insulite Division of Minnesota and Ontario Paper Company.

This change will not alter the personnel, policy, or sales activities of the company; E. W. Morrill, sales manager, and his entire staff, will continue sales operations as the Insulite Division.

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▶▶▶ A STEADY DECLINE is shown in the amount of duty free newsprint imported by Venezuela in 1940 as compared to the previous year. The countries largely affected by this decline are the United States and Canada. In 1939, the United States supplied almost 55 per cent of the amount imported, and in 1940 Canada supplied almost 50 per cent while the United States declined to approximately 43 per cent of the total.

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▶▶▶ FIRE DESTROYED the plant of the Consolidated Paper Corporation, Pembroke, Ontario, along with a large quantity of lumber on July 24. A preliminary estimate placed the damage at from $300,000 to $350,000. The plant, which employed 225 men, will be out of operation indefinitely.

◆

B. C. COMPANY WILL INSTALL NEW DIGESTERS

The British Columbia Pulp and Paper Company, has announced that it plans to install new digesters at the company's plants at Port Alice and Woodfibre, B. C., at a cost of over $500,000. The purpose of this installation is to increase production of the plants to meet demands for pulp from United States markets due to the cutting off of imports from Scandinavian countries. Production of each plant will be increased from 150 to 190 tons per day.

BLOCKED NATIONALS LIST PUBLISHED

Following the President's proclamation of July 17, 1941, *The Proclaimed List of Certain Blocked Nationals* has been published in booklet form. This black list contains the names of more than 1800 Latin American firms and individuals that are listed as pro-Axis. Although a number of the concerns and persons listed are in the small-scale class, it is thought that collectively they represent a strong force against democracy.

Expansion of the scope of this list to other countries is already under consideration.

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▶▶▶ A NEW ACID PLANT is being installed in the plant of The E. B. Eddy Company, Ltd., Hull, Quebec, in which Canadian pyrites will be used instead of imported sulphur in the manufacture of sulphite pulp. It will save approximately $100,000 U. S. exchange a year.

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▶▶▶ A SPRAY-TYPE SULPHUR BURNER has been installed at the Edmunston, New Brunswick, sulphite mill of Fraser Companies, Ltd. It commenced operation July 6, and has a daily capacity of thirty tons, replacing two old burners. This is said to be the first installation of its kind in Canada.

◆

PARKER-YOUNG TAKES THE LEAD IN CAR CONSERVATION

E. W. Tinker, executive secretary of the American Paper and Pulp Association, recently announced that the response of the paper and pulp industry to President Riegel's request for the conservation of freight cars was commendable (cf. THE PAPER INDUSTRY AND PAPER WORLD, July, 1941, p. 420).

The Parker-Young Company, Boston, Massachusetts, on its own initiative, has taken the first step toward the more efficient use of freight cars by attaching a sticker to every invoice and manifest. The sticker reads, "Important! Please unload this car quickly! Every hour gained in the unloading of a freight car helps to maintain service for all shippers and receivers. Help yourself by helping the railroads!"

In making this announcement to members of the Association, Mr. Tinker passed on a suggestion made to them that many of the mills might wish to use some similar method of co-operation.

Editorial

Defense-War Demand Increases

▸▸▸ THE DEMAND FOR PAPER PRODUCTS continues unabated. The consumption continues to eat up all current production as fast as the mills can make and ship it. Stocks of paper products on hand in merchant and mill warehouses have been depleted steadily to negligible quantities. Stocks of pulp, in all positions, are the lowest on record.

The Federal Reserve Bank Industrial Production Index Number continues to make phenomenal gains. The May index was 150; the June index was 156. The average for the first six months was 146, giving an indicated consumption at the rate of 20,960,000 tons per year. Hence, it is not to be wondered at that "OPM Predicts a Paper Shortage" was the screamer-headline in the press reports of July 21.

But, that is not the half of it. The defense-war demand is but getting under way. For the first fiscal year, July 1, 1940, to July 1, 1941, the United States expenditures amounted to but five billion dollars. In this fiscal year, 1941-1942, the expenditures for defense-war goods will be more than four times greater, limited only by the rapidity with which new facilities can be brought into production.

It is our prediction that every aid to the "all-out" production will be forthcoming. American production is headed for fifty billion dollars yearly of defense-war goods. That means the drastic curtailment of civilian consumer goods and the enormous increase in production of war goods. Although this country is not at war, formally, yet to all intents and purposes, we are geared up to a war economy as effectively as though we were working under a declaration of war. All of which means that the paper industry is to become a defense-war industry; that all paper production will be requisitioned for government purposes; that paper for civilian uses will be harder and harder to obtain.

However, by this very same token, the distribution of paper and paper products will call for a two-way service —one to the government supplier, and one to the mill. Those agencies which have been distributing paper products to the consuming civilian public have only to direct the tonnage to governmental channels. There is where the demand originates. There is where the extraordinary volume consumption lies.

The government consumption is essential. That demand must be serviced and met without delay. It should be and will be. No resistance nor reluctance to co-operate with government contractors or suppliers will be tolerated. If necessary commandeering priorities can be used. As between civilian consumption and defense-war demand, the priority goes to the defense-war demand. Necessarily so. For we all agree that as the government has the right to commandeer the manpower of the country for defense-war purposes, it certainly has the right to commandeer those commodities necessary to the equipment and sustenance of that manpower.

Paper is the most essential commodity during peace times. It is the most essential commodity during this defense-war program. It is going to be impossible to increase paper production to meet the overwhelming war demand. The only way the paper supply for government needs is to be obtained is by diverting tonnage from civilian to defense-war consumption.

"Building Tomorrow's Citizens"

▸▸▸ WHAT ARE THE BOYS in your mill community doing during the summer vacation season? Have you been sufficiently interested in their well-being to find out, or have you given little or no consideration to their vacation activities?

For many years, it has been the practice of a large number of mills to find a place on their payrolls during the school vacation season for boys of working age. Although most of these jobs probably go to local boys, most certainly they are not confined to them alone. Not only does this practice permit young men to earn part of their school expenses, but also it gives them an insight into industrial practices.

It goes without saying that some of these youth find the manufacture of pulp and paper so interesting that they return to the industry for their life's work following the completion of their formal education. Others do not see the same fascination in it.

In other words, many pulp and paper mills become proving grounds for young men still in school who are old enough to obtain employment in the mills during the summer.

Such kindness on the part of the mills participating with youth in this manner is to be commended; but what about the boys of mill communities who are not old enough for mill work? Some few mills have realized the need for developing a summer program of activity for these younger boys, at least in one instance, even the girls, and the results have been most gratifying.

The most recent program of this character which has come to notice is the Port Edwards Boys' Club.

Conceived by Lee Turley, advertising and sales promotion manager of the Nekoosa-Edwards Paper Company, Port Edwards, Wisconsin, the Club was organized early in the summer of 1940 through his efforts and those of a number of other Nepco men and the principal of the local high school. Membership in the Club was open to all Port Edwards boys between the ages of nine and eighteen, it making no difference whether their fathers were or were not employees of Nepco, and 54 took advantage of the opportunity.

Numerous were the projects carried out by the Club under the direction of a full time club director and even a bigger program with two men directing the activities is being made effective this year.

In the words of Mr. Turley, "The boys are learning that the world does not owe anyone a living and that by a little effort on their part, in addition to earning summer spending money and having a nice nest egg to be divided by the Club at the end of the year, through work on the newspaper, truck farm and workshop, they get from it two weeks free camping at the Boys' Club camp, now completed."

Already the truck farm has been tripled in size, and a baseball diamond has been added to the camp ground. Also a new beach is being built.

Such an effort certainly is going a long way in "Building Tomorrow's Citizens," the quoted caption of this editorial which was used for the foreword of the *Port Edwards Boys' Club Booster Book*, a publication recently issued by the Club to chronicle its activities for the period June 1940-June 1941—a worthy publication on a very worthy subject.

"Hats Off" to the Port Edwards Boys' Club. May other mills find in it the necessary incentive to stimulate some kind of program for youth in their individual communities!

ADVERTISING PAGES REMOVED

CURRENT THOUGHT

A MAN YOU PROBABLY KNOW . . . BUT NEVER HEARD OF

WILLIAM SIBLEY

WHEN FRENCHMEN BECOME LITERATEURS they don't fool. Consider such super-prolifics as Dumas, Victor Hugo, Proust, Emile Zola or Balzac. Take Zola specifically, for instance. There was a man who wrote every day from 9 to 12:30 and from 3 to 8. In his vast and prodigious 20-volume *Rougon-Macquart* saga there are more than 1,200 characters. Or, Balzac wasn't so slow either. In his *Human Comedy* there are more than 90 stories totalling upwards of four million words. In those 32 volumes there are more than 2,000 characters. Indeed there are two biographical dictionaries that are little more than "Who's Who" in Balzac. Balzac used to retire about six in the evening, then rise at two in the morning for a pot of powerful coffee and a continuous session with his raven's feather pen until two o'clock the next afternoon. Many of his best short stories were written in a single morning. Although square-built and muscular, his terrific pace killed him at the age of 51.

Of course, we don't have to stay in France to find outstanding examples of assembly-line creators of bed-lamp excitement. We can save our money and stay right here where we could find such writers as our perennially diverting friend, now 76 years old, E. Phillips Oppenheim. Of course, Mr. Oppenheim is an Englishman, but he has spent much of his mass-production time in America. To his credit there now stands a row of 76 full-length novels.

Then there was that other prolific Englishman, the late Edgar Wallace. When he was forty-six years old he had written 28 novels, but that was merely a training period for the big bout. During the next ten years he wrote 46 more novels, and had 17 plays produced. Sir Patrick Hastings tells of a week-end spent at the Wallace country estate. Mr. Wallace disappeared during dinner on Friday, emerging from his library hide-out at nine Monday morning, "pallid, unshaven, and with almost hysterical fatigue lining his face —announcing that he had finished his 80,000-word novel." Mr. Wallace went to bed for two days, astounding Sir Hastings by saying that it was nothing unusual. After a flying visit to Chicago and Cicero during the Al Capone era, he dictated his best melodrama, *On the Spot,* in four days and nights.

But, gentle reader, you haven't heard anything yet . . . Hold onto your seats, because I'm going to tell you about a man whose mountain of dictated words makes the works of any of the foregoing look like a sheaf of oats. This man is still aboard this planet, having been born in Seattle, May 29, 1892. He was educated at the University of California and according to the researches of E. H. Dodd, Jr., of Dodd, Mead & Company, has already written as much fiction as Edgar Wallace, J. S. Fletcher and E. Phillips Oppenheim *combined.*

His name is Frederick Faust. Ever hear of him? Probably not, because he has written under no less than thirteen pen names. Perhaps his most famous pseudonym is that of Max Brand, under which he is writing the famous Dr. Kildare novels. Brand's fiction is published in ten foreign countries and languages, but in the United States alone, by 1938, he had published 85 books, 55 short stories, 201 novelettes and 196 serials—25,000,000 words in all. Four hundred and fifty-two magazine yarns have been his, chiefly westerns, but also including Alaskans, historical, Secret Service, Chinese and miscellaneous. He has written two volumes of poetry and at least twenty Hollywood films have been made from his stories.

Mr. Dodd has figured out that to tie this record, Margaret Mitchell would have to write nearly three books such as "Gone With the Wind" each year for 20 years. (I wonder how much black coffee would be necessary to aid such a stunt.) Mr. Dodd would also like to know what sort of vision you would conjure up to picture such a man. He says: "Do you see a fellow, tall to the point of six feet two, with broad shoulders and a massive head? Do you hear a resonant, cultured voice, and sense the predilection of a gourmet for rare wines and fine victuals? Do you visualize him, during years of peace, living in the Italian hills with a beautiful wife? Do you think of him as a dreamy talker of boundless imagination, who could hold you spellbound by the hour as he discoursed on anything from Omar Khayyam to China Clippers? If you do, you're good. For that is just the sort of man Max Brand is."

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PUT HIM ON A FARM

▸▸▸ "Get-In-Or-Get-Out-Burton," former Dean of the University of Michigan, once said: "When your boy graduates from high school, don't send him to college immediately. Put him on a farm and make him earn his own living, without help from you, for one year. If he can't do that for 365 days —never spend another cent on his education, because it will be wasted money for you and wasted time for him. On the other hand, if he can do it at the age of 17 or 18, he will actually benefit by his year's absence—by having the appreciation of the value of money given him, and by putting him in a position to better assimilate university training."

Maintenance of
First-aid Fire-fighting Equipment

C. B. WHITE, Chemist Engineer
American-LaFrance-Foamite Corporation

▸▸▸ ALL FIRE APPARATUS bearing Underwriters Laboratories label or Factory Mutual's mark must come up to certain minimum requirements of manufacture and performance in order to warrant the use of that label on the apparatus. A fire extinguisher may be made *better* than the Underwriters specify (and that's all to the good for the customer) but it may not fall below a certain standard of excellence.

The owner of a modern approved fire extinguisher, therefore, starts out with a well made device and a proper charge for it. The success of the extinguisher in time of emergency depends largely upon the *maintenance* and *proper use* of the unit. *These factors are matters which concern the ultimate consumer and they are his responsibility.*

In other words, the producer of the extinguisher is concerned with the fabrication of the device and the consumer is concerned with its upkeep and use. Each must do his part to secure successful operation at the moment when fire comes.

Although this article is concerned almost exclusively with maintenance, something must be said on the subject of proper use of fire extinguishers. Experience has shown that given a good extinguisher, properly charged and maintained, it will prove of less value in an emergency if the user lacks familiarity with its characteristics than if the user is familiar with the range, duration of discharge, etc. Hence a proper training in the use of fire extinguishers is an important part of their successful operation.

In connection with maintenance of fire extinguishers it seems desirable to treat one type at a time. For that reason, this article is divided into five sections: (1) *Vaporizing Liquid Type*, (2) *Soda Acid Type*, (3) *Foam Type*, (4) *Antifreeze Types*, (5) *Carbon Dioxide Type*.

Vaporizing Liquid Type

The common size hand devices used in the application of vaporizing liquid range in capacity from one quart to two gallons. The most common size is the one quart. The method usually employed for ejecting the fluid from its container is hand pumping, although the sizes of one gallon and larger are equipped with cylinders containing air under pressure which is capable of forcing the liquid out of its container through a suitable nozzle. The normal range of stream for the hand pump devices is around 20 ft. under full pump pressure.

Only the fluids offered by fire extinguisher manufacturers should be used for recharging. They must meet exacting specifications to guard against the presence of impurities. The specifications also determine the freezing point and the specific gravity of the fluid.

Carbon tetrachloride should not be used for charging fire extinguishers. The grades generally sold contain impurities which are likely to be destructive to the device. Furthermore, its freezing point is higher than climatic temperatures often encountered. Vaporizing liquid, on the other hand, is manufactured under exacting conditions, and has a freezing point of minus 50 Fahr.

Water should never be brought into contact with vaporizing liquid extinguishers. Vaporizing liquid does not mix with water except to a negligible extent. Although there is no direct and immediate reaction between water and vaporizing liquid, the phenomenon of hydrolysis does take place over a period of time with the consequent evolution of hydrochloric acid. The acid so produced has in injurious effect upon the metallic extinguisher parts, leading to their eventual destruction.

The addition of water to a vaporizing liquid charge easily accounts for 90 per cent of all the trouble experienced with this type of extinguisher.

The vaporizing liquid type of fire extinguisher should be installed where they may be taken easily from the bracket in case of fire. They should be inspected at regular intervals to make sure they are in good working order and fully charged. This interval should not be greater than six months.

The inspection should consist in removing the extinguisher from its bracket and operating the pump a couple of strokes to make certain that the mechanism is in good working order and that the stream range is adequate. Several key men, not forgetting the watchmen, should be allowed to operate the extinguishers and "get the feel."

After the inspection, all extinguishers should be filled to their rated capacities, and returned at once to their respective places. Any extinguisher which fails in the test should be sent back to the manufacturer for repairs.

Left—Extinguisher hung so that top does not exceed 5 ft. from floor. Nozzle and ring top grasped with one hand while other hand holds bottom handle ready for instant inversion. Right—Soda-acid extinguisher. Run water through hose. Keep cap and stopple with extinguisher. Examine hose and nozzle for damage or deterioration. Examine gasket. Engage four threads.

Left—Vaporizing liquid extinguisher. Never use water. Operate every six months.

Right — Three-package foam charge. Liquid stabilizer poured into clear solution of "B" powder.

Soda-Acid Type

First aid apparatus of the Soda-Acid type range in capacity from 2½ gal. to 40 gal. Such extinguishers depend for their operation upon the reaction between an acid and a carbonate. The former is contained in a glass bottle suspended near the top of the extinguisher and the latter is in solution in water in the shell of the extinguisher.

When the extinguisher is turned bottom up, these solutions come together producing a relatively large volume of CO_2 gas, the pressure of which expels the liquid contents through hose and nozzle.

This type extinguisher should be *discharged and recharged* annually. This recommendation is made by Underwriters Laboratories for very good reasons.

In the first place, sodium bicarbonate in solution tends to lose CO_2 unless the container is hermetically sealed. As CO_2 leaves the solution, the normal sodium carbonate is produced according to the following reaction: $2\ NaHCO_3 \rightarrow Na_2CO_3 + H_2O + CO_2$ or sodium bicarbonate gives normal sodium carbonate + water + carbon dioxide.

This normal carbonate has more or less caustic properties and this causes some attack on the lead-tin lining of the extinguisher shell.

Furthermore, fire-fighting equipment is for emergency use only. For weeks, months, and years it lies idle. Only occasionally is it used, and then it is desperately needed. One way to keep such apparatus at full efficiency is by periodic checkup. The best method for this checkup is actually to operate the device. This determines the efficiency of the extinguisher and at the same time may serve to teach plant employees how such a device operates.

Remove the extinguishers to the recharge rack which should be equipped with hot and cold water, a sewer outlet, standard measures, and suitable clean receptacles for mixing charges.

Line up all the empty extinguishers, remove the caps, take out the acid bottles and start to wash. As each cap is removed, place it adjacent to its respective extinguisher and do the same with all other parts of each assembly. This is very important because you may have more than one type and make of extinguisher. Therefore, all the caps, bottles, cages, stopples, etc., are not necessarily interchangeable.

When the empty extinguishers and their respective parts have all been lined up, go down the line with a hose stream and fill each extinguisher shell to overflowing. Note particularly whether the water flows through the hose and nozzle of each extinguisher during this process. If it does not, set that extinguisher aside for further investigation. Upend each shell, draining out all the wash water. Wash off the caps, lay on side to drain off wash water. Return shells to upright position and examine the inside by lowering in an electric lamp or by the use of a flashlight. Make note of any unusual condition inside the shells. Any that exhibit excessive corrosion or other abuse such as severe denting or damaged threads should be set aside for further inspection. The outlet screen should be clean and free of corrosion.

Each hose and nozzle assembly should be examined with great care. The nozzles are formed of soft metal and a severe blow may cause a complete or partial closure of the nozzle orifice. The hose should be flexible and free from breaks or cracks.

Due attention should be given to the cap and bottle assemblies. The cap threads should be clean and sharp, not worn. The cap should have a properly fitting rubber gasket which should be clean and flexible. If the gasket is not in perfect condition, it should be replaced. The bottle should be gone over carefully for cracks and the bottle holder should be examined for corrosion. Make sure that the lead stopples for the bottles are in good condition and standard for each bottle.

Having made an inspection of all parts of the extinguishers and having them all clean and in workable condition they are ready for charging.

The practice of filling each extinguisher shell to the filling level with water and then dumping in the soda powder should be discouraged. Charges should be mixed and the powder thoroughly dissolved before filling the extinguishers. For this purpose a clean galvanized pail may be used for mixing single charges. Merely use the quantity of water (preferably lukewarm) specified by the manufacturer of the extinguisher and dissolve therein the carbonate powder provided by the manufacturer, stir until thoroughly dissolved and then fill each shell to the filling mark soldered on the inside of the shell.

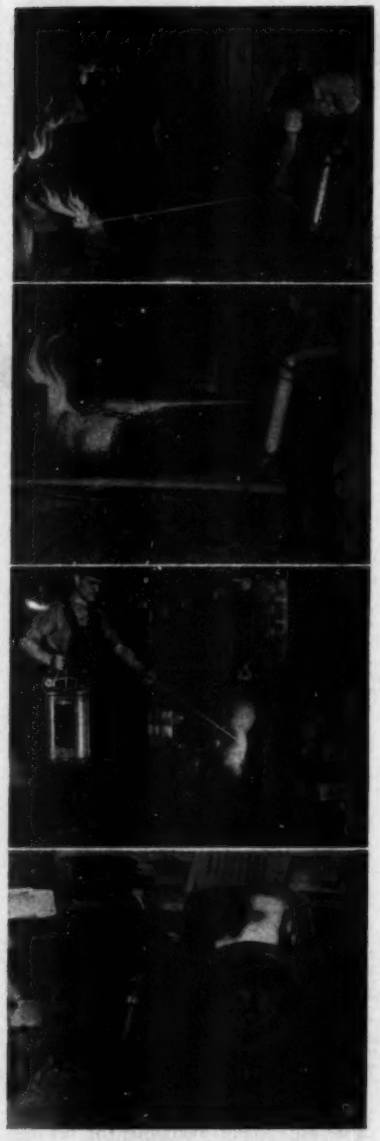
As each extinguisher is assembled, a dab of vaseline or cup grease should be spread on the threads of the cap and just a touch of grease on the rubber gasket. This procedure will be appreciated when cap is removed later. Then the cap should be screwed on tight making certain that *at least four complete threads are engaged.*

Mark the tags with the date of the current recharging using a pencil rather than ink.

The extinguishers are now ready to be placed in position. In general, each extinguisher should be hung near its risk in such a position that it will be available to an operator in case of fire. The top of the extinguisher should be not more than five feet above the floor.

Each approved device of the pressure type is tested upon manufacture to the pressure indicated on the nameplate. The effects of time, abuse, freezing and other factors gradually reduce its strength. An extinguisher with a blocked nozzle may develop internal pressures as high as three hundred pounds per square inch. In one plant the testing of extinguishers to the nameplate pressure caused the rejection of 52 per cent. Some could not stand even 75 lb. pressure.

Blocking of nozzles may result from deteriorated hose, crushed nozzles,



residual dried chemicals, toothpicks, chewing gum (this has actually occurred), or mud daubers. These latter are small wasps which crawl up through the nozzle and build their nests in the extinguisher or hose.

The only reliable method of determining the fitness of an extinguisher for continuance in service is to subject it to a hydrostatic test at the nameplate pressure. Age is not a reliable index. The device may be injured shortly after it has been put in service. A suitable testing device should fill the extinguisher with water for testing through the hose and nozzle. This tests the hose and hose connections at the same time. The extinguisher should be tested with its own cap. That makes certain that the cap joint is strong enough and that the gasket is satisfactory.

Extinguisher Chart

Type of Fire	Heated Risk		Unheated Risk			Heated or Unheated	
	Foam	Soda Acid	Anti-freeze	Vaporizing Liquid	CO_2	Vaporizing Liquid	CO_2
Class "A" Free Burning—wood, textiles, rubbish, etc.	X	X	X				
Class "B" Flammable Liquids—gasoline, oil, grease, etc.	X			X	X		
Class "C" Electrical equipment and machinery						X	X
	Southern Section		Northern Section				
	Foam		Vaporizing Liquid		CO_2		
Class "D" Vehicles—Pleasure automobiles, commercial trucks, etc.	X		X		X		

Illustrated at left are the four types of fires referred to in the above table.

Foam Type

Foam type devices of the 2½-gal. to 40-gal. capacity are in appearance not unlike the Soda-Acid machines. Internally, the most significant difference is an inner metal cylinder instead of a glass acid bottle. They depend for their operation upon a chemical reaction within the extinguisher shell. The reaction is accomplished by turning the extinguishers upside down. When this is done, the "A" solution in the inner cylinder comes in contact with the "B" solution in the outer shell, but unlike the Soda-Acid which discharges a liquid, the Foam type extinguisher discharges a relatively large amount of a stiff, closely-knit foam capable of clinging to a burning object or of floating on a burning liquid.

The point of all this is that although both Soda-Acid and Foam types of extinguishers depend upon a chemical reaction for operation, the reaction plays a very much more important part in the foam type. Here we are concerned not only with the ability of the device to function as a result of the reaction but also with its ability to produce a suitable *quality* of foam capable of smothering fire.

The suitability of an extinguisher to produce a proper foam for fire extinguishment is partly inherent in the design of the device itself, but more particularly in the general *design* and *preparation* of the *charge*. Therefore, if it is important to recharge the Soda-Acid extinguishers according to instructions, it is much more important in the case of the Foam type.

All that was said with regard to preparations for recharging and inspection of the Soda-Acid extinguisher applies with equal force to the Foam type extinguisher. Wherever "acid bottle and stopple" are mentioned under Soda-Acid, substitute "inner cylinder and stopple" and use the direction for the Foam type.

Charges for Foam type extinguishers are on the market in two forms: the three-package and the two-package. The three-package charge is made up of one package of "A" powder and two other packages which are used to produce the "B" charge. The "A" powder is to be dissolved in hot water and poured into the "A" or inner cylinder of the extinguisher. One of the "B" components is a clean white powder which is to be dissolved in warm water to produce a clear water-white solution with no settlement at bottom of container. After the powder is thoroughly dissolved, *and not before*, the contents of the other package, a dark brown liquid, is to be poured into the solution, thoroughly mixed and the combination is to be poured into the "B" compartment or outer chamber of the extinguisher.

The two-package charge is a variant of three-package charge. The "A" powder is in no way different. The "B" powder, however, is a mixture of the white "B" powder and the dried powdered stabilizer.

At first glance, the two-package charge would seem to offer something in simplicity and efficiency, but on second thought it will be seen that with the two-package charge the operator never can tell by observation just when or whether the "B" salt is dis-

solved because the entire issue is clouded by the presence of the stabilizer. Moreover, all stabilizers are colloids and it is well known that the presence of a colloid interferes with the solution of a crystalline salt. It is upon this principle that your true chemist adds the sugar first to his coffee and after it is dissolved he adds the cream. In other words he gets his crystalline sugar dissolved before adding the colloid.

In preparing the "A" solution for the Foam type extinguisher it is well to do the dissolving in an earthenware crock. The solution, especially when hot, has a highly corrosive effect on ordinary tin cans and galvanized pails —the corrosion has an unfavorable effect upon the solution.

In preparing the "B" solution any clean receptacle of suitable size may be used. The temperature of the water is of considerable importance because if it is too hot it will tend to decompose the "B" powder. Most directions call for a temperature not in excess of 110 deg. Fahr. In the absence of a thermometer the temperature known as "lukewarm," best approximates 110 deg. Everyone knows the feel of water which is lukewarm.

Antifreeze Types

One great difficulty with both the Soda-Acid and the Foam type extinguishers is their susceptibility to freezing. No attempt should ever be made to convert these into antifreeze by adding chemical to the solutions. By far the greater portion of extinguisher-protected risks are under cover in factories, homes, offices, schools, but there are some exposed risks for which there is a demand for some sort of a portable extinguisher unit.

It is well known that the Vaporizing Liquid extinguishers and the Carbon Dioxide devices will not freeze; and for the exposed risks for which these devices are acceptable they should be employed. But this still leaves a class of risks—wood, paper, textiles, rubbish, for which some antifreeze solution is required.

For this kind of hazard there are two broad general types of antifreeze devices: the hand operated and the self actuating.

The hand operated pump-tank may best be served by inspection. Note that the tank is properly filled with antifreeze solution. Examine the interior of the tank for signs of corrosion. Limber up the hand pump, actually pumping the solution through the hose and nozzle; directing the stream back into the tank. Note whether the pump works easily and properly; make sure the nozzle is free of corrosion. If anything seems amiss, the liquid should be turned out into a clean receptacle; the tank and pump should be washed in warm water; and a more thorough inspection made to locate the cause of the trouble. Pump-tanks are exceedingly simple devices, so easily accessible and readily serviced that they have much to recommend them for exposed risks.

There are several varieties of self actuating antifreeze extinguishers but none on the market now which depend upon a chemical reaction for their operation. The extreme difficulty of finding suitable chemicals which will react satisfactorily at low temperatures seems almost insurmountable. Therefore it seems necessary for low-temperature operation to supply the solution-propelling force from a small compressed gas cylinder or to produce it by the burning of fuse.

In the former method the extinguisher shell is charged with a suitable powder or a low freezing point solution together with a cylinder containing two and one-half ounces of carbon dioxide. The cylinder is equipped at one end with a frangible disc which, when the extinguisher is inverted, is ruptured allowing the stored gas to escape and supply the necessary pressure to expel the liquid.

The fuse-burning method of supplying the pressure is quite similar to the carbon dioxide cylinder method except that the cylinder is supplanted by an inner cylinder containing a loose weight in the bottom and a sealed capsule composed of several feet of fuse at the top. When the extinguisher is inverted the weight falls on the capsule, setting off the fuse which in burning supplies sufficient gas to expel the solution.

All of the recharging instructions given above under the head of Soda-Acid type apply to these antifreeze types with certain additions in the case of the fuse-burning capsule. In this case it will be noticed that during the burning of the fuse certain tarry residues are produced which water alone will not remove. After discharge of an extinguisher of this type it is desirable to clean off the weight and the interior of the inner cylinder with kerosene before the thorough flushing with water.

Although the author is firmly convinced of the desirability of actually operating these antifreeze extinguishers annually, the same as the Soda-Acid and Foam types, it is common practice merely to make a visual inspection of these devices, at least annually, together with a weighing of the stored pressure cylinders in one case and a very close inspection of the capsules in the other. A drop in weight of a carbon dioxide cylinder would indicate that some or all of the gas had escaped and the cylinder should be replaced. Any wear, corrosion or rupture of a fuse capsule would indicate the necessity for replacement. The capsule should be renewed every five years.

Carbon Dioxide Type

Carbon dioxide at ordinary temperatures and pressures is a clear, colorless, odorless, harmless gas. Reduction of temperature and an increase in pressure to somewhat less than 1000 lb. p.s.i. cause the gas to liquefy. Advantage is taken of this physical phenomenon to fill steel cylinders with a quantity of liquid carbon dioxide which may be discharged at will upon a fire. By the smothering action of a sufficient quantity of this non-combustible gas suddenly applied to certain types of fires, these fires are quickly brought under control.

Carbon dioxide type extinguishers do not require annual recharging. The content is good until used. About the only inspection required is to weigh the cylinders every six months. Discharging them annually on test fires offers an opportunity for personnel training.

Not only should the personnel be told how to operate the extinguishers, but they should have the opportunity to discharge them on actual experimental fires. In the use of the carbon dioxide extinguisher, they should learn by actual practice that it is necessary for them to get a little closer to the blaze with this type than with the others; they should get used to the noise of the escaping gas and become accustomed to the relatively short operating period.

Too often the industrial safety director feels that when he has bought a sufficient quantity of the best portable equipment available for his several risks and has adequately maintained that equipment by proper recharging and inspection that his job has been handled with the utmost efficiency. This, however, is not quite enough especially in this year 1941 when industry has a lot of strange cooks in her kitchen. The safety director's job extends beyond the proper maintenance of the physical equipment because that equipment does not hop off the wall and walk over to a fire and direct its own discharge upon the fire. Some *person* has to do that. Therefore it is increasingly necessary for the safety director to turn his attention toward the personnel of his institution, even to the point of turning school teacher, so that in time of emergency the operator of one of these various extinguishers will have a cool head and a hand "skilled in the art of fire fighting."

TROUBLE *on the Paper Machine*

III—DRYER SECTION

ARCHIE McCAFFERY

▶▶▶ AT TIMES *a dryer section* may get *more steam than it can utilize* in the drying of paper. This situation may occur if the steam regulator is out of order, if the seat of the live steam valve is gone, or if there is ample dryer surface and much new clothing has been installed.

Where a reciprocating engine is used as a power unit, the ring on the piston may become worn, letting steam leak by at either end of the cylinder when the engine is taking steam. This steam, going out with the exhaust, finds its way into the dryers, thus running up the pressure and giving an excess of steam.

Sometimes, in hard working engines, the dog on one of the cross-arms will not unhook. When this situation occurs, the intake port is left open, causing a power disturbance and furnishing an excess volume of steam as well.

All modern machines are equipped with a piping by-pass around the automatic valve. If the automatic valve is out of order, steam can be run around it simply by opening one valve and shutting another. While steam is being by-passed, however, the sheet would have to be dried by hand control of the steam input.

It is well to use the hand control in case of excess steam as a check on the automatic valve. If hand control makes no difference, the automatic control can be put back into use.

If the excess steam comes from a worn ring on the piston of a steam engine, the condition will not develop all at once. As a machine tender becomes familiar with this engine trouble he will be able to anticipate it in time to have the engine repaired before the difficulty arises.

On the other hand, the refusal of a cross-arm dog to unhook happens all at once. Immediately, the machine tender can observe a stock variation on the wire and an excess of steam in the dryers. This trouble seldom occurs except when the governor is about to unhook because of too much backpressure or kindred causes. In such event, the trouble can be diagnosed readily upon looking over the engine.

If the sheet, on account of new clothing, is being dried too much by the exhaust, it might be possible to keep out of trouble by easing up on the presses a bit or by running the sheet a little heavy. If worse comes to worse, there is nothing to prevent the backtender from letting out a little exhaust now and then.

Should a *dryer head blow a gasket*, do not shut down unless advised to do so by your boss. If the dryers have valves in the steam supply pipes, shut off the steam on the dryer with the blown gasket and also close the valve in its discharge pipe. This procedure will end the noise and likewise prevent flash steam from the large return water pipe entering the dryer through the discharge pipe and half filling it with water.

The machine tender always should be on the alert to see to it that the *dryer felt*, in fact, all of the machine clothing does not *mark the sheet*. Complaints from customers of dryer felt impressions in the sheet seldom cover news or coarse grades; rather they commonly cover the finer grades. One complaint of this character, in the experience of the author, involved hanging paper. This paper had passed the scrutiny of the machine help, laboratory help, foremen, superintendents, and inspectors; yet, when treated with filler in the wall paper plant, the filler soaked through because of dryer felt impressions and the paper could not be used.

If a *dryer felt gives out in a seam*, the only thing to do is to break back the paper and close the seam. The delay caused by such a repair job gives time to wash any of the press felts, if they need it.

The trouble just cited recalls an incident in the author's experience when *holes* were put *in* the *paper* by tacks which had been left in a dryer felt seam at the time the seam was made. The tacks did not commence to bother until twelve hours after the machine had started; and, as a result, it was difficult to locate the cause of the holes in the paper.

If *ravelings* are *hanging to* the *edge of* a *dryer felt*, it is plain that something is chafing the edge, causing it to wear off. Ordinarily, a raveling of this kind will not snap the paper off at the calenders. However, if the raveling drags in some water or oil, it will snap the paper off at a rapid rate. The solution is to break back the paper, stop the dryers, and cut off the strings.

A *dryer felt may rope up* or go into a wrinkle if, for some reason, steam is shut off the felt dryers. To prevent such an occurrence, it is necessary to see that the accustomed pressure is on these dryers.

Some dryer nests do not have baby dryers. Dryer felts on such machines are susceptible to wrinkles any time that the sheet comes up heavy.

When a dryer felt runs into a wrinkle, the sooner the sheet is broken back, the better. Do not try to get the wrinkle out of the felt with the sheet in the dryers. A dryer felt may be roped up, in fact, may be turned over without doing any harm if the felt is dry. However, if a felt is allowed to run wet with a wrinkle in it, the wrinkle will stay there. Therefore, immediately upon noticing a felt in a wrinkle, break the sheet, get the felt dry, and take out the wrinkle.

If rolls are out of distance sufficiently to cause the roping, they may be located afterward. It is part of the machine tender's business to know what dryer felt rolls do not draw straight and have them distanced. Even then, there often are crooked draws when a felt is old and runs wet. In this latter case, the machine tender may make use of leaders to draw the felt straight, and, in this way, get a lot more life out of the felt.

Strips of wrapper, 18 or 20 inches wide and long enough to go around the roll one and one-half times, usually are all that is required to correct the draw. Before applying a strip of wrapper to a roll, daub on a little glue to one side of the paper, permit it to dry partly, and then put it on the roll. If applied in this manner, it will not come loose.

EDITOR'S NOTE: This series will be continued in future issues. Parts already published are: I—Fourdrinier Part, in June; II—Press Section, in July.

Acidity in Paper

Expressed in Terms of pH Values

M. S. KANTROWITZ[1]
and
R. H. SIMMONS[2]

▸▸▸ ACIDITY IN PAPER may be caused by the presence of residual chemicals left in the pulp by the processes of manufacture, by chemicals such as alum, added to the paper in order to obtain certain desired results, by acid-forming chemicals absorbed from the air, or by contact with the skin when handled. Acidity from whatever source may result in deterioration of the paper fibers in strength and permanence.

There are two methods for determining acidity, one for total acidity which is the titratable acid content, usually expressed in terms of sulphuric anhydride or sulphuric acid; the other for the active acidity represented by the hydrogen ion activity expressed as *p*H value. Paper acidity is generally measured in terms of *p*H rather than total acidity because it is the effective hydrogen ion concentration that determines the rate of deterioration, and part of the total acidity is due to organic acids which have practically no detrimental effect on permanence. Thus the total acidity measures the quantity of acids present irrespective of their nature whereas the *p*H gives a measure of the effective amount of hydrogen (H) ions or that available for reactions. The *p*H values that may be measured accurately vary from 0 to 14.

Meaning of pH Value

The term *p*H value designates the proportion of acidity or alkalinity in a given solution as a function of the hydrogen ion concentration caused by dissociation, and is the common logarithm of the reciprocal of the hydrogen ion activity.

Electrical methods of determining *p*H values are based on the fact that pure distilled water will conduct an electric current to a very slight degree and a very small proportion of the water is dissociated into hydrogen (H^-) and hydroxyl (OH^-) ions.

By the Mass Law*

$$\text{(1) } \frac{\text{Conc. of H ions} \times \text{conc. of OH ions}}{\text{Conc. of undissociated } H_2O} = \text{a constant}$$

Since the relative amount of undissociated water is very large, it can be taken as a constant and equation (1), therefore, becomes

(2) Concentration of H ions × OH = a constant

By electrical conductivity measurements, this constant has been found to be 1/100,000,000,000,000 or 10^{-14} at 22 C. In pure distilled water, the number of H ions is equal to the number of OH ions; therefore, each has a concentration of 1/10,000,000 or 10^{-7} at 22 C. This method of expressing hydrogen ion concentration is very inconvenient. It is customary to use the logarithm of the reciprocal of the hydrogen ion concentration. Thus

$$p\text{H} = \log \frac{1}{\text{hydrogen ion concentration}}$$

Concentration of hydrogen is in gram-ions per liter.

Just as an acid solution is said to be normal when it contains 1 gram of ionizable hydrogen per liter, so a solution is said to be normal with respect to hydrogen ions when it contains 1 gram of ionized hydrogen per liter. Since 1/H ion is the reciprocal of the normality of H ions in a solution, the *p*H value can also be defined as the logarithm of the reciprocal of the denominator expressing the normality of H ions such as N/10, N/100, N/1000, etc.

The H ion concentration of pure distilled water at 22 C. is 0.0000001 gram per liter, the *p*H value is, therefore, the log of 1/0.0000001 or of 10,000,000 which is 7.0. This value 7.0 is, therefore, the neutral point on the *p*H scale at 22 C. for aqueous solutions. If the number of H ions exceed that of the OH ions, the solution is acid, if there is an excess of OH ions it is alkaline.

The *p*H values below 7.0 denote acidity, the degree of acidity increasing as the numbers decrease. For example, if a small amount of hydrochloric acid is added to pure distilled water which has a hydrogen-ion concentration of 10^{-7} or a *p*H value of 7.0 the total number of H ions in the solution will be greater than 10^{-7} and the solutions therefore will be acid. Suppose the hydrogen-ion concentration in this solution is found to be 0.000001 gram per liter, the *p*H value would, therefore, be the log of 1/0.000001 or of 1,000,000 which is 6.0. Similarly, if the H ion concentration is N/100,000, that is, a one-hundred-thousandth normal solution, the *p*H value would be represented by the log of 1/0.00001 or the log of 100,000 which is 5.0.

On the other hand, if a small amount of sodium hydroxide is added to pure, distilled water, the number of hydrogen ions in proportion to hydroxyl ions in the solution will be decreased. Suppose the hydrogen ion concentration in this solution is found to be 0.00000001 gram per liter, the *p*H value is, therefore, the log of 1/0.00000001 or of 100,000,000 which is 8.0. Similarly if the H ion concentration is reduced to N/1,000,000,000 the *p*H value would be 9.0. The degree of alkalinity increases as the numbers increase above 7.0.

The symbol pH, as originally defined, referred to hydrogen ion concentration, but today it is used with reference to hydrogen ion activity, meaning the "effective concentration" of the hydrogen ions in solution. This value is usually somewhat less than the hydrogen ion concentration owing to the electrostatic forces between the ions, which means that less ions are available for reactions than would otherwise be expected.

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(*) The mass action law states that the product of the activity or "active mass" of the ions divided by the activity or "active mass" of the molecules is a constant. Because of the exceedingly small amount of H^- and OH^- formed in the dissociation of water, their activities are for all practical purposes equal to their concentrations.

Since we are dealing with logarithmic values, a liter of solution having a *p*H value of 6.0 contains ten times as many H ions as one having a *p*H value of 7.0. Similarly a liter of solution of *p*H 5.0 contains one hundred times as many H ions as one of a *p*H of 7.0. A liter of solution of *p*H 9.0 contains ten times as many OH ions as one of *p*H 8.0.

The exact meaning of H ion concentration and *p*H values, and the derivation of the latter, can be made clear by a concrete example.

A N/10 solution of acetic acid contains 0.1 gram of ionizable hydrogen per liter. At 18 C. it is dissociated to the extent of 1.36 per cent. Hence the H ion concentration is $0.1 \times 1.36/100 = 0.00136$ gram per liter. This is equivalent to a N/735 ($1/0.00136 = 735$) solution of H ions. The *p*H value of N/10 acetic acid is therefore the log of 735 which is 2.86.

A non-technical explanation of the meaning of *p*H value may be illustrated by comparison with the scale of the Fahrenheit thermometer. On this scale 32 represents the freezing point of water. Values above and below 32 represent degrees of heat and acid respectively. Values higher than 32 denote an increase in heat, the degree of heat increasing as the numbers increase. On the other hand, values below 32 denote an increase in coldness, the degree of coldness increasing as the numbers decrease.

In a similar manner the degree of acidity or alkalinity of a solution is expressed by the Hydrogen Ion scale. Instead of being called degrees, as is the case of the thermometer, the units of this scale are called *p*H values. On the Hydrogen Ion or *p*H scale, a value of *p*H 7.0 represents neutrality, therefore, if the material tested has a *p*H of 7.0 it is neither acid nor alkaline.

Following the illustration of the thermometer, any values higher than *p*H 7.0, denote alkaiinity, the degree of alkalinity increasing as the numbers increase. Values lower than *p*H 7.0 denote acidity, the degree of acidity increasing as the numbers decrease.

A *p*H value is, therefore, a number denoting the degree of acidity or alkalinity of a solution.

The Measurement of pH Value

Hydrogen ions exist only in solution. It is, therefore, more appropriate to refer to the *p*H value of paper as the *p*H value of a water extract of paper because this is the method by which it is determined.

According to TAPPI method T-435m "Hydrogen Ion Concentration (*p*H) of Paper Extracts", 5 grams of air-dry paper are disintegrated and extracted with 250 cc. of distilled water in a boiling water bath for one hour. The glassware used is resistant to acids and alkalis and care must be taken to protect the extract from contamination with carbon dioxide from the air since the solution is not buffered and may change in *p*H value on exposure to such gases.

Some investigators *(1) (2)* advocate cold extraction for determining paper acidity. In this case, the paper is mixed with water and after letting it stand for one hour at room temperature, the *p*H is determined on the unfiltered mixture. It is claimed that time and temperature of cold extractions do not appear to be critical as is the case with hot extractions. It is, therefore, evident that *p*H values in specifications for paper or in reports of *p*H tests should be accompanied by statement of the kind of extraction used to obtain the values.

There are two methods by which the *p*H value of paper extracts can be measured; the colorimetric method and the electrometric method.

Colorimetric Method

The colorimetric method for measuring *p*H value is based upon the principle that certain dyestuffs known as indicators change their color in acids and alkalis depending upon the degree of acidity or alkalinity of the solution to which they are added. This may be illustrated by the use of litmus which is red in acids and blue in alkalis. Each indicator has its own *p*H range. Some of the commonly used indicators with their *p*H ranges and color changes are as follows:

Indicator	pH Range	Color Change
Meta cresol purple	1.2-2.8	Red-yellow
Bromphenol blue	3.0-4.6	Yellow-blue
Brom chlor phenol blue	3.0-4.6	Yellow-blue
Bromcresol green	4.0-5.6	Yellow-blue
Bromcresol purple	5.2-6.8	Yellow-purple
Chlorphenol red	5.2-6.8	Yellow-red
Bromthymol blue	6.0-7.6	Yellow-blue
Phenol red	6.8-8.4	Yellow-red
Cresol red	7.2-8.8	Yellow-red
Thymol blue	8.0-9.6	Yellow-blue

In making a determination, a few drops of the indicator solution are added to the solution to be tested. An equal quantity of this indicator is then added to each of several solutions of known *p*H values and the color of the solution being tested is compared with those of the solutions of known *p*H value until it matches one of these; the *p*H values of the two solutions which match in color are then equal.

TAPPI method T-435m recommends the isohydric indicator method. *(2) (3)*. The procedure consists in locating the approximate *p*H of the unknown solution by testing with an indicator solution adjusted at the midpoint of its range, and then making a more accurate determination with indicator solution adjusted to the approximate *p*H. This is accomplished by using standard indicator solutions adjusted at intervals of 0.2 *p*H throughout their effective range.

The colorimetric method will measure *p*H to within about 0.1. This method is simple and convenient but has certain limitations. It cannot be used with turbid or colored solutions. Concentrated solutions of protein matter or salts give misleading results, while solutions containing bleaching agents decolorize the indicator.

Electrometric Method

The electrometric is more accurate than the colorimetric method. It consists in measuring the differential voltage of a cell composed of two half cells known as electrodes. One electrode is of fixed potential and the other of a variable potential which is a function of the varying hydrogen ion activity. The potential of the latter electrode depends upon the *p*H value of the solution being tested, therefore if the difference in potential between the two electrodes is measured the *p*H value of the unknown solution may be determined.

The electrode of fixed potential is a saturated calomel electrode which consists of mercury in contact with a layer of calomel and a layer of potassium chloride crystals covered by a saturated solution of potassium chloride. The electrode, whose potential is a function of hydrogen ion activity, may constitute either a hydrogen, an antimony, a quinhydrone or a glass electrode. The electrodes are immersed in the solution to be tested, and the voltage of the complete cell is balanced with that of a standard cell by means of a potentiometer. The *p*H value is then calculated by the application of an equation formula from the electromotive force, expressed in millivolts, required to accomplish this equilibrium, or it may be conveniently read directly from graphs constructed upon the basis of this equation. Corrections must be made in the calculations for variations of temperature at which the readings are taken.

The usual types of electrodes employed in making *p*H determinations are hereafter described.

(1) The Hydrogen Electrode

This method depends upon the fact that platinum in a spongy state will absorb hydrogen. The hydrogen electrode consists of a specially coated platinum wire or foil placed in the solution to be tested and maintained in an atmosphere of hydrogen by bubbling the gas around it. The potential

of the electrode thus formed and the voltage set up between this electrode and the standard saturated calomel electrode immersed in the same solution is proportional to the *p*H value of the solution.

The hydrogen electrode is capable of producing highly accurate results. However, it has many disadvantages. It requires a supply of pure hydrogen. The hydrogen gas passing through the solution may alter the original *p*H by sweeping out dissolved gases such as carbon dioxide or sulphur dioxide. Many substances poison the electrode. Among such poisons encountered in a paper mill are gelatin, bleach liquors, sulphides and sulphites. Traces of oxygen seriously interfere with the determination and measurements cannot be made in the presence of oxidizing agents. The determination also consumes considerable time since the hydrogen electrode has to be saturated before measurements can be made. It can readily be seen that the hydrogen electrode is not suitable for general application.

(2) The Antimony Electrode

This is a metal oxide electrode which requires that the solution tested be saturated with a slightly soluble oxide of the metal. This electrode cannot be used in the presence of oxidizing agents nor in the presence of organic compounds which react with antimonious oxide.

(3) The Quinhydrone Electrode

This consists of a gold or platinum wire which is placed into the test solution saturated with solid quinhydrone. A differential in emf is set up almost immediately upon the addition of the quinhydrone and this can be measured against the calomel electrode. While the quinhydrone electrode can be used conveniently in a paper mill, it has its drawbacks and limitations. It can be used only up to *p*H values of about 8.0 on well buffered solutions and much less on slightly buffered solutions. It is seriously affected by oxidizing or reducing agents in the solution and, therefore, cannot be used with bleach liquors. It reacts with many organic materials such as phenols and amines. It is also adversely affected by proteins and other electrode poisons and its potential is affected by presence of salts of high concentration.

(4) The Glass Electrode

The principle of this electrode is based upon the fact that if two solutions of different *p*H values are separated by a very thin film of a special glass, a difference of potential is set up between them which is a measure of their difference in *p*H value. If the *p*H value of one of these solutions is known, the *p*H value of the other can be determined.

The glass electrode consists of two units. The outer one is a tube ending in a bulb which is sensitive to *p*H changes. The inner unit may comprise a mixture of quinhydrone and hydrochloric acid or other suitable electrolyte and electrode contained in the bulb and electrically connected to the potentiometer. The potential of the electrode depends on the difference between the *p*H of the solution in the bulb and that of the test solution surrounding the bulb. The *p*H of the test solution is found by measuring the difference between the potential of the glass electrode and that of the calomel reference electrode dipped in the same solution.

The glass electrode permits very accurate measurements up to 9.0 *p*H, and is relatively unaffected by the presence of oxidizing or reducing agents, gases, colloids, dissolved organic compounds, or suspended matter. It rapidly and accurately measures the *p*H of unbuffered as well as buffered solutions. However, at *p*H values above 9.0, high sodium ion concentrations cause deviations for which correction must be made. Other alkali metals cause similar but much smaller deviations. The corrections are readily made by the use of buffer solutions having approximately the same sodium ion concentrations as the test solutions or by use of specially prepared graphs. Because of its wide range of application, ease of manipulation, and inertness toward chemical reaction with dissolved constituents of the test solution, the glass electrode is the most generally useful type of electrode. TAPPI method T-435m recommends the use of the glass electrode for determining the *p*H of paper extracts.

The hydrogen ion concentration may be converted, by use of a table of logarithms, from the *p*H logarithmic reciprocals and reported in terms of arithmetical equivalents to denote "Active Acidity" and "Active Alkalinity" by the symbols AA and — (minus) AA respectively *(5)*. The use of the symbols A_H for active acidity and A_{OH} for active alkalinity has also been recommended.

These active acidity numbers are acidity units per liter, the unit being 0.0000001 gram, the amount of hydrogen ions present in a liter of water. They are directly related numbers. For instance, at a *p*H of 5.0, the active acidity is 100 units per liter. At a *p*H of 4.7, it is 200 units of active acidity per liter. Therefore, the difference of 0.3 *p*H represents a difference of 100 per cent in active acidity. In other words, the active acidity at 4.7 is twice as great as that at a *p*H of 5.0. It is obvious that within the single *p*H unit from 7.0 to 6.0 there is very little increase in active acidity. The increase is from 1 to 10, that is, 9 units of active acidity per liter. From *p*H 6.0 to 5.0, the range is from 10 to 100, or an increase of 90 units acidity per liter. From *p*H 5.0 to 4.0, there is a difference from 100 to 1000, or an increase of 900 units of active acidity per liter. The *p*H values, together with their corresponding hydrogen ion and hydroxyl ion values are given in the accompanying table.

Importance of Hydrogen-Ion Control to Paper and Printing Processes

A good sheet of printing paper is the result of bringing into correct relationship the interaction of a number of variables in which acidity (*p*H) plays an important role. However, an equilibrium once established unfortunately may not prove the optimum condition for a second run of the same kind of paper in the same mill at another time. Local variations in water conditions, selection of dyes and sizing systems, and varying qualities and treatments of the stock prevent the use of identical procedures in different mills. Variations in water hardness and alkalinity of the sizing influence the *p*H of the paper produced. The quantity of alum required to obtain the best sizing results can be determined by *p*H control methods. The optimum *p*H range for the sizing operation extends from 4.0 — 6.5*(7)*. Alum used to control foaming of certain stocks in the beaters greatly affects the *p*H of the paper produced. Maximum retention of dyes is obtained at a suitable *p*H, the optimum value depending upon the pulps and dyes used in the manufacture. The retention of some fillers increases as the *p*H rises from 4.0 to 5.6*(7)*. The degree of heat to which the paper is subjected in drying varies the *p*H of the finished paper by influencing the dissociation of acids and salts present.

A very accurate analysis for acidity, or determination of the *p*H value of paper, is most important in the case of rag-book, bond, ledger, and index paper intended for use in permanent records. Rigid requirements for acidity are not necessary if the subject of the printing is regarded as of relatively temporary value, but in the case of important records, their longevity is of paramount importance and this factor must be given due consideration. Paper intended for permanent record use should be required to have a *p*H value of not less than 5.0 when determined by hot extraction.

The acidity of printing inks is con-

trolled by standardizing the acidity of the raw materials of which they are composed.

Nickel electrotyping requires close control of the *p*H of the nickel plating solutions for satisfactory results. There is an optimum range of *p*H within which the nickel is deposited smoothly and without tension. Operation of the plating bath at *p*H values outside this range results in the nickel splitting or curling up at the edges, or in rough and spongy deposits. The *p*H of nickel ammonium sulphate baths is generally determined colorimetrically, using brom thymol blue indicator. A satisfactory range for nickel electrotyping is *p*H 6.4 to 6.8.

One of the most important applications of *p*H control in lithography applies to fountain etch solutions, which are affected by contact with metal, ink, and paper, and by the evaporation of water from the solutions. A *p*H value of 3.8 for zinc and 4.6 for aluminum plates is recommended by the Lithographic Technical Foundation*(8)*. Suitable indicators for controlling the *p*H of fountain etch solutions and damping water are brom phenol blue (*p*H range —3.0 to 4.6) for zinc plates and bromcresol green (*p*H range—3.8 to 5.4) for aluminum plates.

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Corresponding *p*H, H-ion, and OH-ion Values

*p*H	H-ion Concentration $\times 10^{-7}$	*p*H	OH-ion Concentration $\times 10^{-7}$
4.0	1000	7.0	1
.1	790	.1	1.3
.2	630	.2	1.6
.3	500	.3	2
.4	400	.4	2.5
.5	320	.5	3
.6	250	.6	4
.7	200	.7	5
.8	160	.8	6
.9	130	.9	8
5.0	100	8.0	10
.1	79	.1	13
.2	63	.2	16
.3	50	.3	20
.4	40	.4	25
.5	32	.5	32
.6	25	.6	40
.7	20	.7	50
.8	16	.8	63
.9	13	.9	79
6.0	10	9.0	100
.1	8	.1	130
.2	6	.2	160
.3	5	.3	200
.4	4	.4	250
.5	3	.5	320
.6	2.5	.6	400
.7	2	.7	500
.8	1.6	.8	630
.9	1.3	.9	790
7.0	1	10	1000

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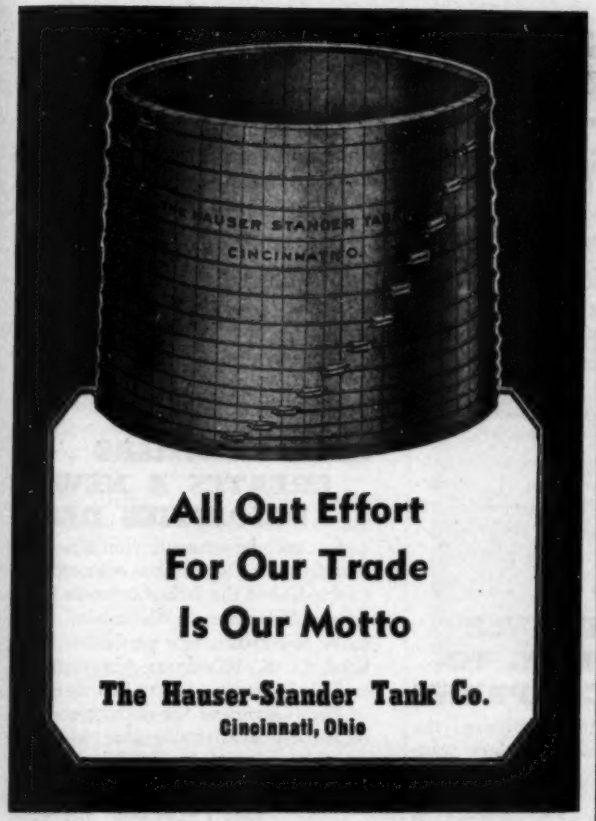
DO YOU KNOW THAT . . . ?

• Among other things . . .—(V) stands for vigintillion, or the highest denomination in our system of numerals. It is the 64th power.

• According to the English and the German systems, the billion is a million of millions; a trillion a million of billions, and each higher denomination is a million times the one preceding . . . According to the French and United States systems, the billion is a thousand millions, and each higher denomination is a thousand times the preceding numeral.

PAPER SKETCHES

ABOUT 1817, POULSON'S "Daily Advertiser," A LEADING PHILADELPHIA GAZETTE OF THE PERIOD, WAS PRINTED ON PAPER TURNED OUT BY THOMAS GILPIN ON HIS PIONEER PAPERMAKING MACHINE. . .
ANIMAL SIZING USED BY OLD PAPER MAKERS WAS MADE FROM HIDE SCRAPS SUPPLIED BY MAKERS OF PARCHMENT.
JAPANESE TORI-NO-KO PAPER BECAUSE OF ITS HIGH QUALITY, WAS SELECTED FOR RECORDING THE PEACE TREATY AT VERSAILLES IN 1919
37 STATES
4400 FIRMS
ONE LEADING PAPER MANUFACTURING ORGANIZATION IN THE UNITED STATES, ACCORDING TO PUBLISHED RECORD, RECEIVES ITS RAW MATERIALS, MACHINERY, AND SUPPLIES FROM OVER 4,400 FIRMS LOCATED IN 37 STATES AND THE DISTRICT OF COLUMBIA.



All Out Effort
For Our Trade
Is Our Motto

The Hauser-Stander Tank Co.
Cincinnati, Ohio

RYERSON CERTIFIED STEELS

PROMPT SHIPMENT FROM 10 PLANTS

When you need steel of any kind, a single bar or carload, order from the nearest Ryerson plant. Write for Stock List.

Bars, Shapes	Shafting	Rivets, Bolts	Alloy Steel
Structurals	Tubing	Welding Rods	Tool Steel
Rails, Plates	Boiler Fittings	Stainless Steel	Floor Plates
Sheets—Strip	Reinforcing	Babbitt, Solder	Safety Tread

Ryertex water-lubricated Bearings give cleaner, more uniform products . . . reduced power consumption . . . longer bearing life . . . and eliminate lubrication—these are some advantages of Ryertex installations on Jordans, Beaters, Press and Couch Rolls, Grinders, Calenders, etc. Write for complete information.

Joseph T. Ryerson & Son, Inc., Chicago, Milwaukee, St. Louis, Detroit, Cincinnati, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

Appleton WIRES
ARE GOOD WIRES

Appleton Wire Works, Inc. Appleton, Wis.

ALLIED

SOLVAY NOW HAS SECTION DEVOTED TO NEW PRODUCTS

A new and separate section which will be known as "Products Development Section" has just been established by the Solvay Process Company, with headquarters at 40 Rector Street, New York City.

In charge of this new section are W. E. Blair, manager, and D. H. Ross, assistant manager. Both of these gentlemen were formerly associated with the executive office of Solvay Sales Corporation, and they bring to this new section a broad knowledge of the chemical industry which they will apply principally to a study of the commercial usefulness of new Solvay products. This new section will work in close co-operation with the research and technical sales groups with a view to broadening the scope of Solvay's service to customers.

◆

RYERSON INCREASES PLANT EFFICIENCY

A total of 35 trucks can now be loaded at one time at the Chicago plant of Joseph T. Ryerson & Son, Inc. Contributing to this fine service are rebuilt and enlarged loading doors which have been added to facilitate faster loading.

Another addition to the Ryerson plant which will increase the efficiency of its system is the new connecting bridge between the two main office buildings, which is now under construction (See illustration). When completed, this 66-ft. glassed-in span will hasten the flow of work between departments and expedite customer service.

◆

▶▶▶ TEN TIMES THE AMOUNT of smokeless powder made last year is the rate of production revealed by the six months financial statement issued by the Hercules Powder Company, Wilmington, Delaware. The announcement that carried this information, stated at this rate of production the company is on or ahead of schedule with the various national defense contracts now being handled.

◆

NAVAL ORDNANCE BUREAU FLAG TO 14 COMPANIES

The OPM recently considered the effectiveness of that elementary principle of psychology—that any workman likes to be commended when his work is well done—and decided to apply it to the defense program. A plan was laid out to award medals to men and companies doing outstanding work in defense, but public announcement of this movement was held up—some objections being raised that the plan might reveal some secret or undercover activities.

About this time, Secretary of the Navy Frank Knox started a move to revive the awarding of the Naval Ordnance Flag to plants doing outstanding work—the same as was done in 1918. And so during the last week of July the Ordnance Flag was first awarded to 14 companies who are up to or ahead of schedule in defense work, and the workmen of these companies received emblems marked "E"—for excellence. The essence of this award is the thought of "well done."

Among the 14 companies who received and are entitled to hoist the blue, red and yellow flag of the Naval Ordnance Bureau are: Bausch & Lomb Optical Company; E. I. du Pont de Nemours & Company, Inc.; and International Nickel Company.

◆

ALLIS-CHALMERS CREATES A NEW PRIORITIES DEPT.

A new department, the Priorities Management Department, was recently established at the Allis-Chalmers Company, Milwaukee, Wisconsin, with L. W. Grothaus, vice president, as its head, G. B. Woody as administrator, and O. S. Larkby, Jr., as first assistant.

The function of the department will be to help in directing the company's activities in matters pertaining to priorities and also to co-ordinate and assist the other departments.

◆

EXPANSION UNDER WAY AT PLANT OF JESSOP STEEL CO.

As part of a large plant expansion and modernization program, The Jessop Steel Company, Washington, Pennsylvania, has begun construction of a new 84-inch, two-stand plate mill, which will be housed in an extension of the company's sheet mill building, the extension consisting of four additional bays. The mill is electrically driven and will be supplemented by the installation of six modern heat treating furnaces capable of increasing plate production fifty per cent.

The company also has under construction a building for storage of billets, ingots, scrap and other raw materials.

◆

MATHIESON MAY BUILD $16,000,000 MAGNESIUM PLANT

Another new project to fit into the National Defense program is the proposed $16,000,000 plant just announced by the Mathieson Alkali Works, New York City. This plant, which it is said will be the second largest magnesium metal plant in the United States, will be built at Lake Charles, Louisiana, and it is expected

the plant will be rushed to completion within a year.

Plans for this plant are said to be subject to approval by the Defense Plant Corporation, as the construction will be financed with federal funds. It is expected that the annual production of magnesium at this plant will approximate 15,000 to 20,000 tons.

◆

NOPCO TO BUILD NEW PLANT ON PACIFIC COAST

A new manufacturing plant is to be built on San Francisco Bay in Richmond, California, by the National Oil Products Company, Harrison, New Jersey. The new plant will be used for the production of vitamin-fortified oils and other vitamin products used for poultry and animal feeding, as well as vitamin concentrates for the food and pharmaceutical industries.

It is expected that in the future the facilities of the plant will be expanded to include the production of chemicals for industries such as: pulp and paper, petroleum, metal workings, textiles, cement, paint and varnish, leather, plastics and cosmetics.

◆

NEW BLDG. IN SOUTH FOR AMER. CYANAMID & CALCO

The Calco Chemical Division and the American Cyanamid & Chemical Corporation recently moved into a new building, which was built especially for the needs of these two organizations, at 3333 Wilkinson Boulevard, Charlotte, North Carolina. Previous to the change, American Cyanamid was located at 822 West Morehead Street and Calco at 1112 South Boulevard.

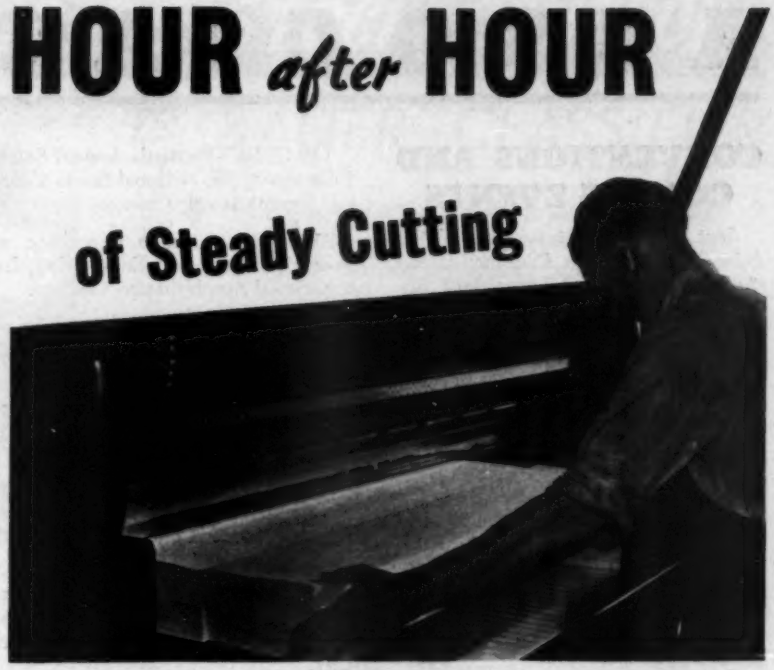
The new air conditioned building, consisting of 8,600 square feet of space, was especially designed for these two chemical concerns. The laboratories which Calco Chemical Division will be using, are lighted by daylight fluorescent lighting. All of the most modern machinery and equipment have been installed.

◆

▶▶▶ RUBBER COVERED ROLLS are the latest addition to the line of Industrial Rubber Products sold by Thermoid Rubber, Division of the Thermoid Company, Trenton, New Jersey. This company has added a new member to the staff, T. D. Dantzler, to promote the sale and to insure high quality of this product. Mr. Dantzler has been affiliated with the rubber industry for 22 years, most of which time has been spent in the production, and sale of these rolls.

HOUR *after* HOUR

of Steady Cutting



FINDS **ATKINS** KNIVES

"Raring to Go!"

• Double and even triple service between grindings is the experience reported by users of Atkins Paper Knives. The reason for this unusual, cost-reducing service is a typical Atkins achievement: the proper combination of special analysis steel and special heat treatment. The result is a tough, keen long-lasting cutting edge that makes faster, cleaner cuts and, when re-ground, takes a new edge with less honing.

Chipper Knives, Slitters and Slotters, and other Atkins Finishing Knives are made to the same high standards. Get convincing proof by specifying "ATKINS" on your next replacement order.

From Trees To Paper, There's Help at Every Step *with*

ATKINS

KNIVES AND SAWS FOR THE PAPER INDUSTRIES

Get Performance Data on

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Chipper and Barkmill Knives
Circular Paper Slitters
Flatbed Paper Cutters
Cutting, Perforating, Creasing Rule

E. C. ATKINS AND COMPANY
453 S. Illinois St.
Indianapolis, Ind.

ASSOCIATIONS

CONVENTIONS AND COMING EVENTS

Sept. 12-13—Joint meeting of the New York-Canadian Division of the American Pulp and Paper Mill Superintendents Association with Empire State Section of TAPPI, at the Sagamore, Bolton Landing, New York, on the shores of Lake George.

Sept. 15-17—Fall Convention of National Paper Trade Association, Chicago.

Sept. 16-20—Fall meeting of the Technical Association of the Pulp and Paper Industry, University of Michigan, Ann Arbor, Mich.

Sept. 17-19—Annual Conference of National Industrial Advertisers Association, Royal York Hotel, Toronto.

Sept. 26-27—Maine-New Hampshire Section of TAPPI, Orono, Maine.

Oct. 3-4—Pennsylvania-New Jersey-Delaware Division of the American Pulp and Paper Mill Superintendents Association, Ritz Carlton Hotel, Atlantic City, New Jersey.

Oct. 6-10—Thirtieth Annual Safety Congress of the National Safety Council, Stevens Hotel, Chicago.

Oct. 6-11—Chicago Exposition of Power & Mechanical Engineering, International Amphitheatre, Chicago.

Oct. 11-14—National Association of Waste Material Dealers, Inc., San Francisco, Calif.

Dec. 1-6—Eighteenth Exposition of Chemical Industries, Grand Central Palace, New York.

Jan. 26-30, 1942—Seventh International Heating and Ventilating Exposition, in the Commercial Museum, Philadelphia.

Feb. 16-19, 1942—Annual meeting of the Technical Association of the Pulp and Paper Industry, New York City.

STATED MEETINGS

Technical Association of the Pulp and Paper Industry.

Delaware Valley Section—First Friday of each month—Engineers' Club, Philadelphia, Pa.

Kalamazoo Valley Section — First Thursday of each month—Park American Hotel, Kalamazoo, Mich.

Lake States Section—Second Tuesday of each month—Conway Hotel, Appleton, Wis.

New England Section—Third Friday of each month—Roger Smith Hotel, Holyoke, Mass.

◆

NAM APPOINTS COMMITTEE ON ECONOMIC POLICY

The National Association of Manufacturers met in the first of a series of discussions with leading economists at New York City on July 11. At that time, announcement was made of a newly created committee on economic policy, the aim of which is to study possible solutions to problems that inevitably will affect the nation's economy during the post-war period.

Named on this committee were: Chairman, Thomas B. McCabe, president Scott Paper Company, Chester, Pennsylvania; Gen. Robert E. Wood, chairman of the Board, Sears Roebuck & Company, F. N. Bard, president of Barco Manufacturing Company, Chicago; and Walter P. Paepcke, president Container Corporation of America.

◆

▶▶▶ THE GROWTH OF TRADE ASSOCIATIONS is strikingly pointed out by the *Washington Review* in an item which appeared in its issue of July 14. In support of the statement that trade association membership and income continue to show healthy gains, reference is made to a survey just completed by the trade association of the Chamber of Commerce. This survey reveals that 325 leading associations picked up a 3 per cent membership increase in 1940 over the preceding year, and that the income increase was 4 per cent.

◆

Interest in exhibit space at the N.I.A.A. Toronto Conference, September 17-19, will be considerably heightened by the showing of a large display illustrating Canada's war effort. This will be transferred from the Canadian National Exhibition to the Royal York Hotel, scene of the conference.

SAFETY

SAFETY ENGINEER ENGAGED IN NAT. DEFENSE PROGRAMS

The recently appointed special investigating agent for a newly created national defense bureau is A. M. Green, safety engineer and assistant personnel manager for The Paraffine Companies, Inc., San Francisco.

Mr. Green will represent the Committee to Conserve Manpower in Defense Industries, and will be engaged in inspecting plants and sponsoring safety programs in plants handling national defense contracts.

◆

▶▶▶ SAFETY SHOES, containing a metal toe cap to prevent toe injury, must be worn by all workers in a number of departments of the Kimberly Clark Corporation, Neenah, Wisconsin. This order will go into effect October 1, and only an affidavit from the corporation's doctors will exempt an employee from the order.

CONTEST SCORES

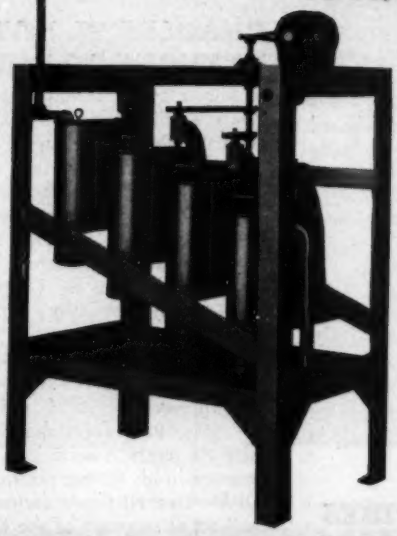
The annual contest among mills in the Paper and Pulp Section of the National Safety Council closed June 30.

Due to the fact that all reports must be in before final scores can be published, additional time is needed to figure scores following the close of the contest. Therefore, the final scores, as of June 30, were not ready when this issue went to press.

Watch this section for closing figures on the contest.

ACCURATE STOCK CONTROL

with the BAUER CLASSIFIER



- The Bauer Classifier makes possible a precise determination of stock properties at any time during the beating or refining process.
- Provides four pulp fiber fractions by direct weight, one by difference.
- Shows physical variations, which can be checked, giving laboratory control over stock uniformity.
- Sturdy, unit-welded steel construction, maintenance-free operation.

Write now for full information.

THE BAUER BROS. CO. SPRINGFIELD, OHIO

The BAUER CLASSIFIER

WHAT WE MEAN BY *Economy*

As we see it, a Lindsay wire gives you economy when it improves your paper quality year after year, while its cost, considering purchase price and maintenance, becomes less. To that end, research at Lindsay is a continuous, expanding phase, into which we cheerfully put more and more money every year.

THE LINDSAY WIRE WEAVING CO.

Serving the Paper Industry Since 1903

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Lindsay WIRES

THIS SPRAY FILM IS YOUR DEFENSE FOR CLEANER AIR!

Designed to meet special mill requirements for cleaning air.

BUILT FOR THE JOB!

Murray Air Washers embody the patented Murray Spray Wheel that does not clog with sediment or particles in the water, and is self-cleaning at all times. Its efficiency is maintained throughout the entire operating cycle. Lowest maintenance cost. Its one piece construction eliminates possibility of breakdowns, and because of its design furnishes a steady, dependable and uniform spray film. Each installation is engineered to meet your mill requirements. Send us details of what you need—air volume, area, etc. for our recommendations.

D. J. MURRAY MFG. CO.

WAUSAU, WISCONSIN

NAMES *in the* NEWS

Personals

DR. MINOR NOW IN CHARGE OF LAB. AT HURLBUT

An interesting announcement came from Edward A. Sitzer, president of Hurlbut Paper Company, South Lee, Massachusetts, last month with the news that Dr. Jessie E. Minor, consultant and widely recognized authority in paper chemistry, is now in charge of the laboratory at the Hurlbut mill.

For some time, Dr. Minor has maintained an office and laboratory in Springfield, Massachusetts, where she has carried on intensive research work. She will now devote all of her time to her new connection, having given up her office in Springfield and moved her complete laboratory equipment to the mill at South Lee.

The Hurlbut company is very fortunate in securing the services of Dr. Minor as the products it manufactures are highly specialized to meet the exacting requirements of present day industry.

Dr. Minor is a graduate of Drury College in Springfield, Missouri, and won the degree Ph. D. in chemistry at Bryn Mawr College. Among other honors, she held a fellowship in chemistry at the University of Pennsylvania; was professor of chemistry at her alma mater, at Goucher College, and the Mount Holyoke Daughter College in South Africa.

Prior to establishing her own laboratory, Dr. Minor served as consultant with several large paper companies and was engaged in research work for a time with the Writing Paper Manfacturers Association.

Dr. Minor's articles have appeared from time to time in this magazine.

◆

PARAFFINE COS. GIVES AWARD FOR 50 YEARS SERVICE

Half a century of continuous service to one company was the occasion for a celebration on July 18 at the Emeryville (California) plant of The Paraffine Companies, Inc. On that occasion, A. E. Harbidge, 68-year-old machine specialist, was presented with a gold watch by R. S. Shainwald, chairman of the board, assisted by J. T. Coleman, plant superintendent. W. H. Lowe, president of the company, gave the veteran worker a three-month vacation check.

An interesting highlight of this event was that R. S. Shainwald, board chairman, is a runner-up—he only lacks seven months of completing his 50-year record. In addition to Mr. Shainwald, the following were present at the ceremony: President Lowe, Superintendent Coleman, Research Director Dozier Finley, Watchman John Peters, Box Shop Foreman George Manning, and Assistant Superintendent Ford Tussing. Totaling the years of service of those present, the sum would be 294 years, or back to the beginning of the Manchu dynasty in China.

◆

MacARTHUR RETIRES FROM LINK-BELT CO.

After nearly fifty years of service with Link-Belt Company, Chicago, F. V. MacArthur has resigned as secretary and assistant treasurer of the company and is retiring. Announcement already has been made that Harry E. Kellogg, treasurer and assistant secretary, has been elected to succeed Mr. MacArthur, making Mr. Kellogg secretary-treasurer of the company.

F. V. MacArthur

H. E. Kellogg

In line with this change, other advancements announced are: Melbourne P. Anderson, formerly general accountant, has been appointed assistant treasurer; and Henry C. Oakes, statistician, has been advanced to the position of assistant secretary. Frank H. Brandt, accountant at the company's Chicago plant, has been appointed general auditor in charge of accounting.

◆

▶▶▶ Announcement of his resignation as superintendent of the Crossett Paper Mills, Crossett, Arkansas, was received last month from *E. L. Hobaugh*. At the same time, Mr. Hobaugh stated he had accepted a position as superintendent with the Union Bag and Paper Corp., Savannah, Georgia.

CHARLES W. BOYCE RETURNS TO THE OPM

Immediately following an order from Washington that men on duty with the OPM were barred from positions as trade association executives, Charles W. Boyce, secretary of the Kraft Paper Manufacturers Association, resigned his position as assistant consultant to D. C. Everest, in the Pulp and Paper Unit of the OPM (cf. THE PAPER INDUSTRY AND PAPER WORLD, July, 1941, p. 324).

Later developments, however, have caused Mr. Boyce to reverse his decision to leave the OPM, and following his resignation from the Kraft Paper Manufacturers Association, he was reinstated in his former position with the OPM. Dernell Every, former assistant, will act as secretary of the Kraft Association.

◆

BRUCE SUTTLE APPOINTED SUPT. AT ST. MARYS

An interesting announcement came from St. Marys Kraft Corporation last month. This company, which is building a new kraft pulp mill at St. Marys, Georgia, has appointed Bruce Suttle superintendent of the new mill. A. G. Ready is the mill manager.

Mr. Suttle has had wide experience in production, particularly that of sulphate pulp from southern wood.

◆

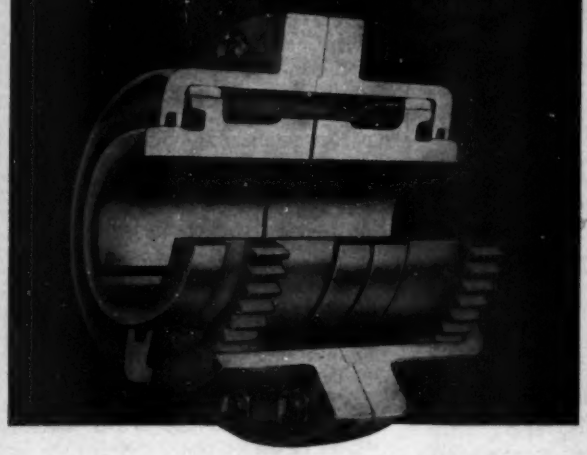
▶▶▶ From Washington (D. C.) comes the announcement that *U. M. Dickey*, president of the Soundview Pulp Company, Everett, Washington, has been appointed co-ordinator for the Defense Contract Service at Seattle, Washington. The Defense Contract Service is a branch of the OPM designed to help the Army and Navy spread defense work into additional factories.

◆

McELWAIN RETIRES AFTER 63 YEARS IN PAPERMAKING

A praiseworthy record of 63 years as a papermaker was ended when R. Franklin McElwain of the Crocker-McElwain Company, Holyoke, Massachusetts, decided for the second time that he would retire. Mr. McElwain retired from the business the first time at the age of 63 and returned in 1939

POOLE



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POOLE FOUNDRY & MACHINE COMPANY WOODBERRY, BALTIMORE, MD.

PARIS BLACKS

BLACKS KNOWN FOR THEIR TONE, STRENGTH AND MISCIBILITY

BLAC-KING 45 RX

An aqueous dispersion of Carbon Black with a solid content of 45%. This product is specially designed for use as a coloring agent for paper. Clean to handle and eliminates possible contamination of other colors in the beater room.

Samples and information on request

UNITED CARBON COMPANY

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You Can Reduce
Pulp-Wood Chipping Costs with
Heppenstall E.I.S. Alloy Steel

Chipper Knives

Proved in actual operations, Heppenstall E.I.S. Alloy Steel chipper knives will give you more service between grindings, lose less width in grinding, and require less power to operate than ordinary plain carbon steel knives. These profit-making advantages mean that your knife cost, grinding cost and power cost go down —and you get more pulp-wood chipped for every dollar you invest in knives.

The reason you get this outstanding service from Heppenstall E.I.S. Alloy Steel Knives is that we make our own steel. It is a patented analysis containing a balanced quality of carbon, chrome, molybdenum and vanadium—a steel that permits from 40 to 50 re-grinds. Then, too, Heppenstall E.I.S. Alloy Steel Knives make less sawdust—they hold a sharper cutting edge longer.

Get the most for your money—make your next order Heppenstall E.I.S. Alloy Steel Knives. Write for full information—no obligation.

HEPPENSTALL COMPANY

PITTSBURGH · DETROIT · BRIDGEPORT

HEPPENSTALL QUALITY

Guaranteed

To show a unit cost below that of any other chipper knives on the market.

at the age of 74 to carry out the duties of president and general manager (cf. THE PAPER INDUSTRY AND PAPER WORLD, May, 1941, p. 168). His second retirement became effective last month.

Mr. McElwain came to Holyoke from Becket, Massachusetts, in 1880, and first worked in the office of the Valley Paper Company. He held other jobs in paper mills, and in 1890, went to the Crocker Manufacturing Company which was sold in 1899 to the American Writing Paper Company, Holyoke. After three years, both Mr. Crocker and Mr. McElwain left the American Writing Paper concern, and in 1913 they took on the Chemical Paper mill and set up the Crocker-McElwain mill. Production of the mill has been increased from 6 tons a day to an output of 130 tons a day during Mr. McElwain's business career.

◆

FIFTY YEARS WITH ONE PAPER COMPANY

A papermaker employed by the same firm for 50 years, George A. Thompson, Sr., retired as superintendent of the Whiting Paper Company, Holyoke, Massachusetts, in July. Mr. Thompson started his career with the company in 1885 as a back tender and advanced through the ranks to the position he held when he retired.

To have worked for one concern for a half century is in itself an honor, but in those years to have given instruction to the future heads of the company is another honor which Mr. Thompson holds. When the veteran superintendent first started with the Whiting mills, William Whiting, who later was to serve as Secretary of Commerce under President Coolidge, used to come in the mill in the summer months to learn the business, and Mr. Thompson was his teacher.

It was under the same guidance that Edward, William, and Fairfield Whiting, the present heads of the company, received training in the paper industry. Mr. Thompson recently celebrated his 72nd birthday.

◆

F. D. GOTTWALD MADE PRES. OF ALBEMARLE PAPER

The board of directors of the Albemarle Paper Manufacturing Company, Richmond, Virginia, met on July 21 and elected F. D. Gottwald president of the company, to succeed the late H. Watkins Ellerson.

Mr. Gottwald had been made executive vice president of the company during the late president's illness. He first joined the company's export department in 1917. Later he served as production manager until 1934, when he was named vice president.

◆

MAGGART RESIGNS FROM CHAMPION— JONES APPOINTED

The resignation of Roy Maggart, superintendent of the Board Division of the Champion Paper and Fibre Company, Hamilton, Ohio, became effective July 1. The company announces that Gilbert Jones, who for many years worked under Mr. Maggart as night superintendent, has taken over Mr. Maggart's duties.

Mr. Maggart is now on vacation and has made no announcement of his future plans.

◆

CASSIDY MADE PRES. NIAGARA ALKALI CO.

Following the recent union of Niagara Alkali Company and Electro Bleaching Gas Company, Niagara Falls, New York, officers were elected to serve the new combined company which is now known as Niagara Alkali Company (cf. THE PAPER INDUSTRY AND PAPER WORLD, p. 378, July, 1941). J. Clarke Cassidy, for a number of years works manager of the two companies, has been elected president; and E. D. Kingsley was made chairman of the board. S. W. Jacobs and S. J. White continue to serve as vice presidents.

Mr. Cassidy has had long and valuable experience in both the production and management departments of this organization. Many of the pioneering steps taken in introducing the companies' products and adapting them to new uses were brought about with the co-operation of Mr. Cassidy as works manager.

◆

GARDNER-RICHARDSON PERSONNEL CHANGES

The board of directors of The Gardner-Richardson Company, Middletown, Ohio, announces that it has selected C. L. Keller, a board member, to be chairman of the board, to fill the vacancy made by the passing of J. M. Richardson. At the same meeting, Robert R. Richardson was elected a board member and was named company secretary to succeed Paul Richardson, who resigned to accept a vice presidency in The Richardson Company, Lockland, Ohio.

Two other appointments included the election of W. E. Sooy to a vice presidency, and the election of E. T. Gardner, Jr., to the office of assistant to the president.

◆

▶▶▶ To succeed the late Robert C. Douglas, the Norton Company of Canada, Limited, Hamilton, Ontario, has appointed *Philip N. Cooke* as resident manager. Mr. Cooke has been with the Canadian company since it was founded and has been sales manager for the past fifteen years. *D. M. Chisholm,* of the Canadian sales organization, has been appointed sales manager to succeed Mr. Cooke.

◆

THILMANY CO. GIVES WATCHES TO OLD-TIMERS

Five employees of the Thilmany Pulp & Paper Company, Kaukauna, Wisconsin, have been awarded gold watches for having been in the employ of the company for more than 40 years. The five men include Ben Rademacher, Fred Goetzman, Otto Doering, Otto Minkebige and Mike Gerharz. The watches, together with pins to men in the firm's employ for more than 25 years, were presented by C. R. Seaborne, vice president of the company.

PULP
BLEACHING
COMPANY

•

WAUSAU
WISCONSIN

•

CELLULOSE
PURIFICATION

Necrology

R. C. FARRINGTON

The Austin Company, Cleveland, Ohio, widely known in the engineering and industrial construction field, has suffered a great loss in the passing of Robert C. Farrington, its chief mechanical engineer.

Mr. Farrington had been associated with the Austin organization since 1918, and prior to that time had been engaged in professional engineering work.

The Austin Company has designed and built a number of modern plants both in the paper industry and its allied industries. At the time the world's first windowless factory was to be built by the Austin Company in 1931, Mr. Farrington was engaged in a large construction project in Russia and returned home to supervise the work on the Simonds plant. The Austin Company also designed and built the first windowless paper mill—the plant of the Blandin Paper Company, Grand Rapids, Minnesota.

Mr. Farrington is survived by his widow, a son and a daughter.

◆

CHARLES T. RAMSDEN

As this issue goes to press, word is received of the passing of Charles T. Ramsden, vice president of the Beloit Iron Works, Beloit, Wisconsin. Mr. Ramsden was 71 years of age. He was widely known throughout the industry.

◆

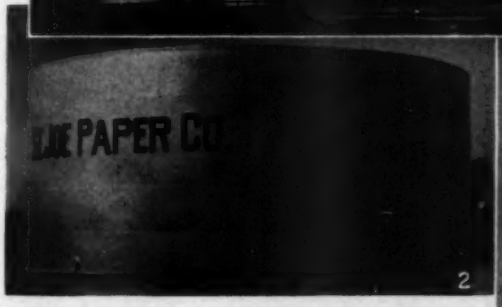
NORVAL H. BUSEY, JR.

Norval H. Busey, Jr., of Stockbridge, Massachusetts, president of the Smith Paper Company, Inc., from 1918 until his retirement in 1932, passed away suddenly following an auto accident in Lee, Massachusetts, on July 29. Mr. Busey was born in Baltimore on March 22, 1874, and after attending a private school, spent eight years in Paris, and three years in Milan, Italy, before returning to this country in 1902.

◆

▶▶▶ *Clifford K. Judd,* president of the Judd Paper Company, Holyoke, Massachusetts, passed away on July 3 at the age of 62. Mr. Judd, the son of the founder of the company, entered the concern as an office boy in 1897. Later he served as secretary until his father passed away in 1929, at which time he took over the duties of president.

5 TYPICAL EXAMPLES OF STEEL TANKS and PLATE WORK to MEET PAPER INDUSTRY NEEDS



(1) General view of St. Joe Paper Co. sulphate pulp and paper mill, Port St. Joe, Fla. (All of the units shown in the accompanying illustrations are installed at this mill.) (2) 55,000-bbl. flat-bottom fuel oil tank. (3) 5,000 cu. ft. capacity lime bin. (4) Three 12 ft. diam. by 60 ft. black liquor tanks. (5) Four 12 ft. diam. by 45 ft. 4 in. sulphate digesters.

ILLUSTRATED here are five examples of steel plate work fabricated in our shops for the paper industry. They are of modern construction, designed to meet specific paper mill requirements. Long experience in working with this industry has made us appreciative of the special problems and needs of paper mill people. Whenever you are contemplating the installation of storage tanks or steel plate work of any kind, write our nearest office for estimating figures.

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Boston.....1562 Consolidated Gas Bldg.
Los Angeles.....1459 Wm. Fox Bldg.
Chicago.....2445 McCormick Bldg.
New York.....3350-165 Broadway Bldg.
Havana.....402 Edificio Abreu
San Francisco.....1017 Rialto Bldg.

Plants at Birmingham, Chicago and Greenville, Pa.

Convention Papers . . . Abridged

The Bracing of Rolls, Skids, and Bundles of Paper for Carload Shipment

J. G. BUCUSS, Sales Manager
Strapping Division, Acme Steel Company

Two fundamental methods are now in use at most of the paper shippers' plants. First, there is what is known as the *Full Floating Method*, which involves the assembly of two or more skids bound together with flat steel bands. These bands encircle the larger units either horizontally or diagonally. Under this method the unit is free to shift under impact and come to a sliding rest through friction with the floor of the car.

There are receivers who prefer a modified form of the Full Floating Method which is now termed the *Semi-Floating* bracing procedure. This employs the use of anchor plates threaded to flat bands and then nailed to the car floor approximately 4 or 5 feet from the front and rear of the unit. One or two bands are used vertically for each row of skids dependent upon the quality of the paper and the routing over which the cars are moved. Under this method, only 1x4 or 1x6 vertical members are toe nailed to the front and rear of the unit over which the flat bands are tensioned. This is a very economical job of bracing and has proved adequate.

Another method that is being used successfully is known as the *Horizontal Anchor or Fixed Method of bracing*. For this method of bracing the anchor plates are threaded to one end of the flat band and then nailed to the car side walls in a horizontal plane around a wood gate construction at the front of the unit only. The anchor plates should always be nailed to the car studding and the number of bands to be used is dependent upon the height of the unit of skids. The construction of the gate should be substantial enough to prevent breakage or flexing and be of the same dimension as the face of the unit.

There are a number of methods now in use for bracing rolls of paper stowed on bilge, but again the fundamental procedure that has been found most satisfactory is in the assembly of units bound tightly with flat steel bands. The reason, of course, is to prevent chafing of individual rolls, which is one of the primary causes for damage. Unusual success in the prevention of chafing has been found through the use of what is known as the *Skid Check Method*. In this procedure two pieces of 1x6 or 1x8 top surface boards are used as skids for a given number of rolls. One 2 in. hole is bored at each end of each skid board and the flat steel band threaded vertically through the holes. The position of the holes is predetermined by the size and number of rolls in the unit. The rolls are then placed on the boards and the two bands are tensioned tightly and sealed. This results in not only removing the rolls from the floor, but provides for mass weight of from 10,000 to 15,000 pounds per unit. It should be pointed out that these units should consist of either five or three rolls as vertical pressure and continuous contact of the bands with all rolls are needed. To prevent side shifting of units and to maintain the units in line under impact, ½ x 2 wood guide strips are nailed to the floor of the car at the outside of each skid board. This method has been found very effective especially for bracing book and other fine papers.

Another method extensively used is commonly known as the *Fiber Cradle Method*. Under this procedure units of five rolls are assembled and flat bands are placed on the floor of the car. Several thicknesses of fiber board are used to almost completely encircle the unit of rolls. The bands are then tensioned and sealed. Again the principle involved with this method is an attempt to remove the rolls from direct contact with the floor of the car to prevent either oscillation or rubbing of the rolls against the car floor. This method lacks the rigidity of the Skid Check Method and will not entirely eliminate the possibility of side shifting of the units.

A compromise of these two methods was recently worked out in employing the *Vertical Anchor Method* for bracing units of box board and other heavy papers. In this procedure 1x8 top surfaced boards are placed parallel with and throughout the length of the car floor with the boards held in position through the use of guide blocks ⅜ in. thick, 4 in. wide, and 6 in. long. The guide blocks prevent movement of the skid boards. The flat steel bands are anchored to the floor of the car and tensioned and sealed over the top of units of five. Under this particular method vertical pressure is exerted between the rolls and the skid boards to create additional frictional contact and results in restricting the movement of the units. The heavier paper stock in rolls is being moved to destination under this method without damage. A similar method with the bands applied horizontally can be used for bracing a few rolls at the car sides where it is necessary to obtain weight. An improved method for doing this job very successfully is the employment of the *Horizontal Anchor Method* with the anchor plates attached to the car side walls and the flat bands tensioned and sealed around the unit of two or more rolls in a horizontal plane. Again with this procedure it is necessary to use top surfaced boards nailed to the side walls of the car and each end chamfered to remove the chance of the rolls contacting the car wall surface and the possibility of damage from the anchor plates due to slight possible movement.

Bundles of paper or paper bags can be successfully braced under the Horizontal Anchor Method. Oftentimes it is necessary to use a light wood gate construction. In other instances only heavy paper is used between the bands and the product itself.

Recent Developments in Labor Problems

ALAN G. GOLDSMITH, Vice President
The Mead Corporation

Some months ago when I talked to your group in Savannah, I pointed out the increasing responsibility resting on the superintendent these days in view not only of the increasing number of labor laws themselves, but also the continuous stream of decisions by the National Labor Relations Board which affects the conduct between employer and employee. Employers, or top executives themselves, must keep familiar with these developments and you, who, with your foremen, have the actual contact with the employees, must keep up-to-date.

At the last semi-annual meeting of the National Paperboard Association, the reports by the General Counsel of the Association, Mr. Malcolm Whyte, as well as Mr. Finley Bell, who is the Association's labor expert, were in their entirety devoted to the question of labor legislation, in general, as it had developed in the last twelve months, and as it affected the paperboard industry itself.

The paper industry with a considerable concentration of its plants in small communities, and with an extraordinary fine and, in most cases, a rather intimate personal relationship between employer and employee, did not have in the past anything which might be called a real labor problem. Today, however, the entire situation in the country has changed. Unionization has progressed in all industries and Mr. Bell points out that in the paperboard industry alone about half of the companies have labor agreements and about 70 per cent of all the workers are operating under such labor agreements.

It does not follow as so many think that unionization means labor troubles, and that labor troubles eventually mean strikes. In many cases, and this is particularly true in our industry, labor leaders are men of high character and employers and managers and superintendents with advanced thinking, have been able to handle situations as they arise in a considerate, thoughtful and intelligent manner.

Obviously, in our industry as well as in others, the problem has been complicated

Abridgments have been prepared of a large number of the papers presented at the annual convention of the American Pulp and Paper Mill Superintendents Association, which met at Poland Spring, Maine, June 17-19, 1941. The first installment was published last month. Other installments will appear in succeeding issues.

NATURE

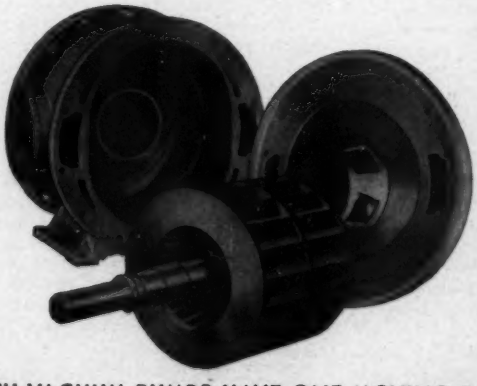
Formed our Trademark
in Yellowstone National Park

ASTEN FELTS

Picture below shows the Monad in Trout Creek, near where it empties into the Yellowstone River, about 4.5 miles by roadway from Old Faithful Geyser. This Monad is the Chinese Symbol of Yang-Yin which we adopted for the Trademark of Asten Dryer Felts. If you picture our trademark as being flat on the ground, you will immediately recognize the rambling course of Trout Creek below as closely resembling our trademark, without the two inner circles or eyes.

ASTEN HILL MFG. CO. PHILA.

SIMPLICITY



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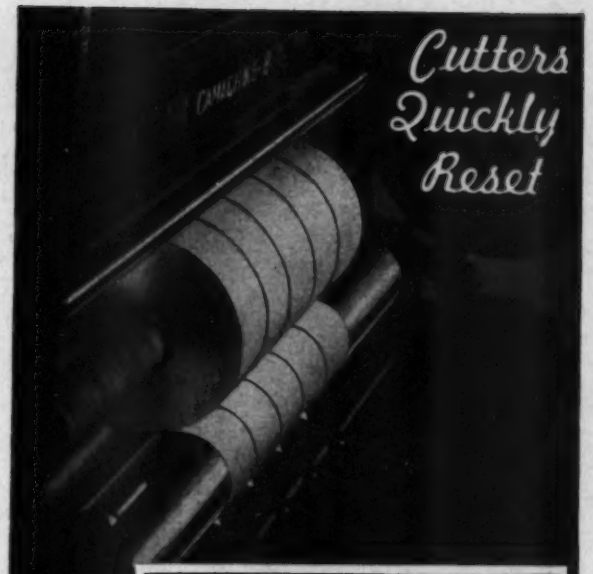

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The above is quoted from a letter from Mr. George B. Goldman of the Goldman Paper & Paper Stock Company, Inc. CAMACHINES are especially efficient under the conditions outlined above, and we would welcome the opportunity to send you illustrated literature. Please let us hear from you.

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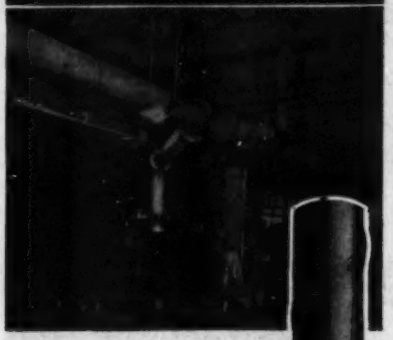

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by difficulties outside of our control. We have two contending forces in organized labor, each endeavoring to organize in its own interest, not always reflecting the best interests of the workers themselves. We all know that the workers' interests and the employers' interests are identical, that any effort made either by the employer or by union leaders to deny this will only result in grief for both, and that if this idea is kept at the fore in any discussion, the proper solution is bound to be obtained.

Then, however, we must hark back to the realization that those in contact with the problem must keep up to date, must know these decisions and interpretations, and must study them thoroughly. This is especially true for those who to the workers actually are the interpreters of company policy.

The question of employing and dismissing labor, formerly so simple, has now become one involving thorough and up-to-date knowledge of intricate laws and decisions of governmental agencies. Collective bargaining covers a large majority of the employees in our industry. The superintendent today who does not keep apace of the times in this tremendously important branch of his activity, and who does not apply this knowledge in a conscientious and intelligent manner, is evading to a great degree the responsibility of his position.

Types and Characteristics of Coating Starches

GLENN E. PRICE, Sales Engineer
National Starch Products Inc.

This paper reviews the commercial aspects of coating starches rather than the results of any fundamental research.

At present, starch coatings are being used where good ink receptivity, high press speeds, low offset, and clear impressions are the major requirements. These properties, along with high coating speed and low drying costs, are characteristic of properly made starch coatings.

The reliable suppliers of these coating starches are continually conducting research in an endeavor to find methods of improving their products. As a result, much technical data is available. However, because of the acuteness of the world situation, it seems advisable to present actual down to earth facts at this time.

In a review of the market situation today, we find that other binders, predominately casein, used for coatings have undergone sharp increases of price, probably due to a scarcity of the raw materials which because of their food value are finding their way across the ocean both from this country and from South America.

Many properties of casein are desirable but today the major question is "Are all these desirable properties essential?" A sound policy for all coating men right now would be to decide for just which jobs casein is indispensable and to conserve the supplies for this work only.

Present day coating starches when used with a knowledge of their natural limitations and adjustments made to balance their chemical and physical differences can be used in the great majority of cases as a replacement for casein.

In considering the natural limitations, we find the major point of difference between starch and casein coatings is waterproofness. None of the starches commercially available today fulfill this purpose for coating. However, you will perhaps be interested to know that tremendous strides have been made in the production of water resistant starch products in the adhesive field, which find application in weather proof packagings for the defense industries.

Another point of difference between starch and casein, and one which is superable, is bonding strength. A question most often raised by coating men not too familiar with modern coating starches is "How can I get an adequate pick test with starch?" It may suffice to say that when given the necessary information, the desired pick can be obtained by the proper choice of starch product in the great majority of cases though, in general, more starch than casein will be needed (thus the starch to casein ratio is about 1.3 to 1).

To give adequate pick it is desirable that the binder be uniformly distributed throughout the coating on the finished stock. Therefore, adsorption of the binder on the pigment is helpful. This brings about an inter-relation between types of pigments and the binder.

A third point of difference between starch and casein is final gloss attainable. Starch is usually associated with dull coatings largely because it has long been used for cheaper grades of paper where light coats are applied or coarse pigments are used. The finish obtainable is more dependent on pigments used than on binder. However, with the same pigment composition starch coatings are slightly duller due to the higher per cent of binder needed. This loss seldom exceeds 15 per cent. By pigment adjustment and use of the proper starch, maximum gloss obtainable with a starch coating should not be far from that of casein coatings.

Another point which is sometimes questioned regarding starch coatings is the machining properties. Some coating men because of past experiences may feel that starch coatings are more difficult to handle on the coater. This usually means that they have not used the proper type of starch as there are starches available today which when prepared properly, machine as readily as the best casein coatings, with a wide margin of safety.

A thorough understanding of how to get the maximum good out of any type of coating starch is probably best approached by recognizing that starch is an insoluble granule and must be cooked with water before developing any binder or adhesive action.

In order to assure that all granules are in the broken or colloidal condition, the cooking procedure should make provision for both time and temperature factors, and while some products cook more readily than others, 200 deg. Fahr. for 10 minutes is a good average recommendation.

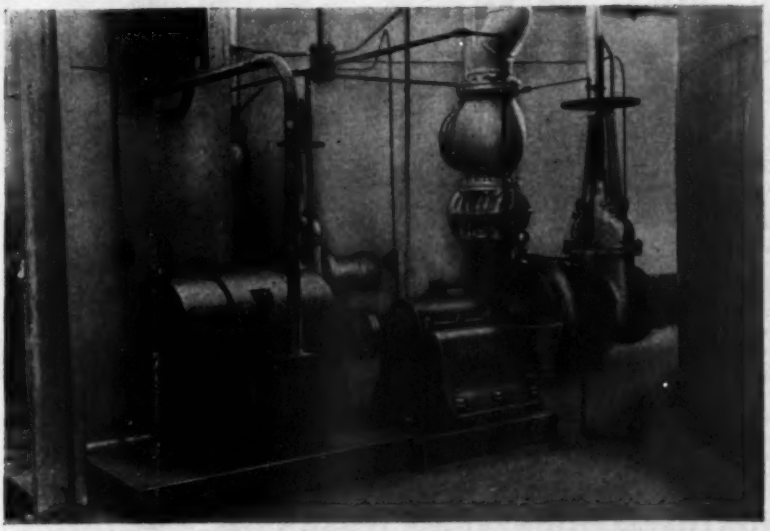
Like many other materials the desirable properties of starches reach a maximum in the cooking procedure, and continued cooking or overcooking begins to break down

19 WARREN LIQUOR PUMPS

Together With 33 Other Warren Pumps Prove Their Dependability And Efficiency Over Period of Years In Southern Mill

This is only one of many "case histories" on file with Warren and if you want a liquor pump that keeps cool and on the job in hot, steady work, please note these Warren features: Easily replaceable case liner takes up wear in handling thick and corrosive liquors . . . Large stuffing box with large water chamber for effective cooling . . . Impeller keeps pressure on the box practically the same as at suction inlet . . . Coupling is all metal, having no rubber bushing to deteriorate. And most important, you can remove the rotating member without moving the motor or disconnecting either the suction or discharge line.

For the complete facts, write for bulletin. And on your next installation or replacement, check with Warren on a pump *built to fit the job.*



Typical Warren Type "L" Liquor Pump at a prominent Southern Paper Mill.

WARREN PUMPS

Warren Steam Pump Co., Inc., Warren, Massachusetts

these properties. Therefore, caution must be exercised against overcooking as well as undercooking. Maximum adhesion comes just after the granules break, and as heating is continued the colloidal particles are broken down with a resulting loss in strength.

In considering the chemical and physical differences, we find that when casein, properly cut, is added to the clay slip good freeing action may be had. This is probably due to the absorption of the casein by the pigment and/or the absorption of the charges on the pigment. However, starch is probably absorbed to a smaller extent by the pigment and so little freeing action results. It is, therefore, desirable to make use of certain chemicals to offset this difference. Recourse is most frequently had to adjustment of the final *p*H to 8.5 or thereabouts. This adjustment is best made by adding alkali to the slip before adding the starch. Polyvalent cations such as phosphates e.g. sodium hexametaphosphate give more freeing action at the same *p*H than the monovalent alkalies such as NaOH, Na_2CO_3, and NH_4OH.

While borax, often used with casein, has good freeing action, it also has a decided effect on the viscosity and flow of the starch. Since it tends to increase the viscosity it must be used with discretion.

Starch products available for coating fall into three broad but basic classes: (1) Enzyme converted starches, (2) Thin boiling starches, (3) Chlorinated starches. However, each must be further subdivided because of the wide range produced within each class. The most common variation is probably the production of several standard fluidities within each class. The method of manufacturing gives various properties to each variation. The type of raw starch, whether it be root or cereal starch, also varies the properties of the finished products.

In all enzyme conversions there is need for close control to assure uniform coating viscosities. The importance of this uniformity is enhanced when the final product is to be used at a high concentration of solids as in the case of coatings.

In the thin boiling starches we find products of uniform viscosity, but relatively low in strength and stability properties.

The chlorinated starches possess the highest bonding strength, have the best flow characteristics with excellent stability and, of course, are available in various standard viscosities.

While there are uses for each type of coating starch available today, the properties of chlorinated starches most closely approximate the properties of casein; and it is to this class of product that your attention should be directed in considering replacement.

With the proper selection of coating starch, finished coatings can be obtained which are substantially equal to casein coatings in every commercial respect except waterproofness.

Acknowledgment—I wish to express to R. K. Britton, of our technical service department, my appreciation for his valuable assistance in the preparation of this paper.

Developments of Stream-Flow Vat System

PHILLIP H. GOLDSMITH
Sales and Development Engineer
The Pusey and Jones Corporation

The first Stream-Flow installation started operation in January, 1940, at the Waterville mill of the Hollingsworth & Whitney Company. It consists of four Stream-Flow Vats 48 in. diameter x 134 in. face and four up-flow head boxes.

The Stream-Flow Vat has an outer vat circle which serves as a final approach pass before the making board. The inner vat circle is independently adjustable at front, bottom and back.

The up-flow head box consists of an inner cone in which the flow rises and an outer cone, the bottom of which connects to the underfeed pipe. It is introduced between the pump and the vat to permit air to escape and to absorb any irregularities in flow.

The Mead Corporation decided that a Stream-Flow System could improve the formation of .009 in. chestnut, which is an unusually difficult stock to handle. A Stream-Flow System was consequently ordered for their Harriman (Tenn.) mill. This unit has a Stream-Flow Vat with a mold 60 in. diameter x 150 in. face. The system also includes an up-flow head box, a Flow Spreader and a Flow Mixer.

The Flow Spreader is basically a properly designed hydraulic nozzle which receives the thoroughly mixed stock from the single

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underfeed pipe with a circular cross-section and delivers it to the vat inlet with the same consistency and flow velocity at every point across the full width of the machine.

The Flow Mixer is used for intimate mixing of the various parts of the flow in the constricted throat where no air can be entrained.

The Stream-Flow System started operation in September, 1940. The formation bottleneck was gone. A superior sheet now runs at 400 f.p.m.

The first repeat order for newly developed equipment is always especially gratifying. The Hollingsworth & Whitney Company had acquired a used cylinder machine for their new Mobile (Ala.) mill. They knew that the old style vats with which the machine was equipped were now antiquated.

The layout arrived at by the mill is an unusual one, the screens being located in the basement. This wet end consists of four Stream-Flow vats 48 in. diameter x 124 in. face with four up-flow head boxes.

The Union Mills Paper Manufacturing Company makes a large variety of very high-grade kraft and rope sheets for special purposes and have a long established reputation for quality in their field. Ralph G. Simonton, an operating executive with thorough experience in the game, knew where and why his machines were limited. The Stream-Flow Vat System was what he had been looking for.

It consists of three Stream-Flow Vat Systems with molds 48 in. diameter x 90 in. face, Up-Flows and Flow Spreaders. The Stream-Flow Vats are equipped with telescopic spill gates which permit the level inside the mold to be lowered to any point desired without deep spill chambers. The customer specified complete corrosion proofing and after a thorough investigation rubber lining was chosen, which maintains smooth flow surfaces and makes washup easy. Mr. Simonton also selected the new Adjustable-Flow Vat Pumps in preference to centrifugal pumps with valve control.

Since the Stream-Flow wet end started operation in February, 1941, all grades have been running at top driving and drying speeds. This represents production increases up to 33 per cent for the most difficult grades.

The first Stream-Flow System for roofing is at this time of writing under process of erection at the New Orleans mill of the Flintkote Company. It consists of a Stream-Flow Vat with a mold 60 in. diameter x 92 in. face, a Flow Spreader, an up-flow head box, a Flow Mixer, an Adjustable-Flow Pump and all the main piping.

The Crocker Burbank and Company Association have indicated their approval by ordering a Stream-Flow wet end consisting of four systems with molds 48 in. diameter x 104 in. face.

One boxboard mill has under construction three Stream-Flow Vat Systems with molds 48 in. diameter x 106 in. face for use in the top liner, under liner and back liner positions. Four of the old vats with smaller molds will be retained as filler vats to be replaced at a future date by Stream-Flow Vat Systems. This contract included Stream-Flow Vats, Up-Flows, Flow Spreaders, Adjustable-Flow Pumps and all the main piping. The flow surfaces are rubber lined.

Selection of Calender Roll

WARD O. WHEELER
Wheeler Calender Roll Company

The material which has been found through practice to be most suitable for the service required is cotton. After selecting the proper cotton, the mechanical work done on this cotton before pressing the roll will in a large measure determine the type of roll that we will get.

The three characteristics of interest to the papermaker are hardness, which will determine the crushing action on the sheet; surface, which will determine the quality of surface imparted to the sheet; and resilience, which will control the amount of marking done to the roll and from the roll to the sheet. Unfortunately, these three qualities cannot be ideally combined in one roll. The paper roll in which the fiber has been most completely broken down will be the hardest and most completely closed up surface. However, due to its very structure any marks which get into a paper roll will be harsh and will not run out, since the roll is not resilient. The cotton roll, which in general is soft, is very high in resilient properties. Consequently, it is free of marks but will not impart as high a surface finish, nor will it withstand severe operating conditions as well as the paper roll.

With this as a background, any papermaker must then analyze his requirements and choose the roll most nearly suited to his operating condition. The first consideration is quality of the sheet and surface, with cost entering the picture both from the standpoint of roll life and operating delays, due to sanding time and roll changes. In some cases the initial cost of the roll is a small part of the total cost.

There is a further possibility in acquiring combination results by using different rolls in the same stack. This has an immediate disadvantage from a maintenance standpoint because it is necessary to have spare rolls for each position that is different from the others. There are two general ways of varying the stack. The first is to use a top and bottom roll different from the remainder of the stack, and the other is to work with a graded stack, so that the width of the nip is uniform. This involves having each succeeding roll down the stack harder in exact proportion to the additional weight that it must carry. There are strong arguments in favor of either of these methods of stack variation, which in some cases offset the maintenance difficulties.

From a roll making standpoint we have found that the most satisfactory roll to run is as soft a roll as will stand up in the service. The harder roll crushes the sheet and does not deform to suit any irregularities in the sheet so that it takes more sanding time, as well as being a harder roll to sand. In calendering coated papers another characteristic that is general is resilience. We know that raw cotton is the most resilient. This ties in to the idea of the soft roll, since the more work we do on the cotton the less resilient it becomes. Various foreign materials have been added with some success. Wool is the best known of these, being a fine fiber, and a very resilient one.

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THREE PLUNGER STUFF PUMP

A Pump that can take it — straight flow through easily reached bronze ball valves in reversible seats — motor or pulley drive.

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This is the sixth installment of abridgments of papers presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in New York City, February 17-20, 1941. Previous installments appeared in the March, April, May, June, and July issues, and will be continued until abridgments of all available papers presented at this meeting have been published.

Some Aspects of the Chlorination of Sulphite Pulp

N. W. COSTER[1] and R. I. THIEME[2]

What takes place when elementary chlorine as gas or chlorine water reacts with the lignin or lignosulphonic complex of an unbleached sulphite pulp? We might just as well admit that we do not exactly know, since we know neither the exact structure of the lignin molecule nor the exact part of it that reacts with the chlorine.

Under conditions where elemental chlorine is the active agent there are several possibilities as to the nature of the reaction involved. The reactions which result in the formation of the soluble lignin compounds will fall into two classes, namely, substitution and addition.

The principal consideration regarding these two types of reactions is their end products. In the case of substitution, hydrochloric acid is produced in an amount exactly equal to one half the chlorine added. This is true too in the case of oxidation, hydrochloric acid being produced in an amount equal to the chlorine added. In the case of addition, all of the chlorine is taken up by the lignin and no hydrochloric acid is produced.

(1) Technical Director, (2) Chemical Engineer, Soundview Pulp Company.

TABLE 1—COMPARISON OF CHLORINATION TREATMENTS

		Method A	*Method B*	*Method C*
Chlorine added, lb./ton pulp		68	68	68
Chlorine absorbed, lb./ton pulp		62	57	59
Temperature of pulp suspension, deg. C.		14–15	14–15	15–16
Chlorinating time, minutes		90	90	90
Pulp consistency, % airdry		3.0	3.0	3.0
Caustic used for neutralizing, lb./ton pulp		65	27	10
*p*H at end of chlorination		1.7	2.4	3.9
*p*H at end of neutralization		7.1	7.2	7.4
TESTS ON CHLORINATED PULP				
Brightness		61.7	57.2	64.8
Bleachability, % Cl_2		0.4	0.6	0.5
Cuprammonium viscosity, c.p.		83	81	75
1% NaOH solubility, %		13.6	14.0	15.2
	Beating minutes			
Burst	5	42	38	39
	35	82	81	78
	65	102	99	96
Tear	5	227	221	248
	35	164	174	168
	65	147	154	138
Freeness	5	880	880	870
	35	810	820	800
	65	630	700	620

We list in Table 1 the results obtained when treating the same kind of pulp in three different ways: (A) With elemental chlorine (Chlorine Gas). (B) With hypochlorous acid made from chlorine, water, and limestone. (C) With hypochlorous acid in "its state of liberation", a patented process (Coster, N.W., U. S. pat. 2,195,396; Can. pat. 387,836).

An examination of these data shows that the reaction is the fastest when using chlorine gas, and the pulp produced has the lowest bleachability. The chemical and physical tests on the chlorinated pulp indicate that slightly stronger pulp is obtained when using chlorine gas than when using hypochlorous acid. However, the differences shown are so small that they lie within the experimental error and therefore do little more than show a trend.

Of the two hypochlorous acid methods (B and C), Method C, using the same in "its state of liberation" is to be preferred because it not only produces the best pulp but works at a *p*H where no special precautions for acid resistance have to be taken. It has been used for a number of years with great success in a mill where the chlorinating cells were lined with ordinary tile and no special arrangements were made to protect metal parts (as agitators, shafts, valves, etc.) coming into contact with the chlorinated pulp.

The experimental chlorinations referred to in this paper have all been carried out at a consistency of 3 per cent for convenience. The mill operations referred to are conducted at a consistency of 3 per cent to 4 per cent.

Practical considerations of pulp production make prolonged chlorination periods unfeasible. In plant operation a time (total) of 45 to 60 minutes is the most suitable one. This allows for the exhaustion of 90 per cent to 95 per cent of the chlorine even at fairly high chlorine concentrations, and yet does not necessitate extensive equipment.

Chlorination experiments were made at temperatures of 5, 15 and 30 deg. C.

Naturally bleach plant operations in the mill will not be subject to the variables in temperature used in these experiments, however, excluding bleachability it is our biggest single variable. The following data are the result of a large number of determinations showing the effect of winter and summer conditions upon chlorine exhaustion rate:

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Temperature deg. Fahr.	Bleach-ability	Exhaustion (45 min.) per cent
50	4.7	92.0
70	4.9	92.8

It is to be seen that there is practically no change in conditions due to temperature. The effects are of such small magnitude that they are overshadowed by more important variables in the pulp making process.

Chlorine concentration is the controlling variable in the chlorination process. Values found for additions of 35, 50, and 65 per cent of the chlorine demand of the pulp show particularly wide variations in bleachability, brightness, and viscosity.

Our experience has been that the chlorinated pulp should have a constant chlorine demand regardless of the bleachability of the unbleached pulp from which it is made. In the subsequent bleaching treatment, not more than 15 pounds of chlorine per ton of pulp should be used to obtain the desired brightness.

As a rule the rate of chlorination is guided by the amount of excess chlorine at the end of the chlorination period, and the bleachability of the chlorinated pulp. Another means for guidance would be to determine the organic material brought into solution during the chlorination process.

Before the equipment manufacturers were able to furnish the industry with washers made from material able to withstand and resist the hydrochloric acid and residual chlorine present in chlorinated pulp, it was necessary to add sufficient alkali to the pulp suspension to produce a *p*H of at least 7. Due to the large amounts of alkali needed for this reaction it was necessary to use a fairly inexpensive material in order to keep the cost down. As a result, about the only material available was calcium hydroxide. Phelps and Schuber [Phelps and Schuber, *Paper Trade J.* 106, No. 8:126-128 (Feb. 24, 1930)] and others have shown that lime together with chlorinated lignin form an insoluble compound that is precipitated on the pulp fibers and cannot be fully removed during further bleaching procedure. Experience from plant operations has proven to us that if lime is used for neutralizing the chlorinated pulp, color reversion of the fully bleached pulp during long time storage is greater than if sodium hydroxide is used for the same purpose. However, now that the industry has washers available made from acid resisting materials, it is not necessary to neutralize the chlorinated pulp before washing.

No matter how efficiently the chlorination has taken place, it will be of little avail if the chlorination products are not properly removed in the subsequent washing. To do so, it is not only necessary to dilute the chlorinated pulp with white water, which is as pure as practical operations will allow, and run the washer at such speed that a uniform sheet, free from lumps, is formed, but to allow the sheet enough time under the showers to give ample time for dispersion.

Even with the most efficient washing it is impossible to remove the last traces of hydrochloric acid and residual chlorine from the chlorinated pulp. Inasmuch as it is necessary to have the subsequent treatment with hypochlorite take place under alkaline conditions it is desirable to neutralize the chlorinated pulp before the hypochlorite is added to it.

This neutralization can, of course, take place in the same vessel in which the hypochlorite bleaching occurs, but, if so, it will be done before the hypochlorite has been added. However, as the hypochlorite would react with these compounds and use up chlorine, it is better to remove them before the hypochlorite bleaching takes place.

By adding a small amount of sodium hydroxide to the chlorinated pulp as it leaves the washer, enough to raise the *p*H of the pulp suspension to 9, and then leaving it in an agitated chest for approximately one half hour, good results have been obtained.

The temperature at which the neutralizing treatment is made depends upon the temperature of the washer cake and dilution water. Year around mill operation will show a maximum temperature variation of approximately 45 to 70 deg. Fahr. Whether temperature control would result in a sufficient improvement to justify the added cost is a matter for additional investigation.

The pulp used was a strong bleachable sulphite pulp made from western hemlock having a bleachability of 5.24 per cent Cl_2 according to TAPPI Standard 1214.

***Acknowledgment*—The authors wish to express their appreciation to the management of the Soundview Pulp Company for permission to publish this paper.**

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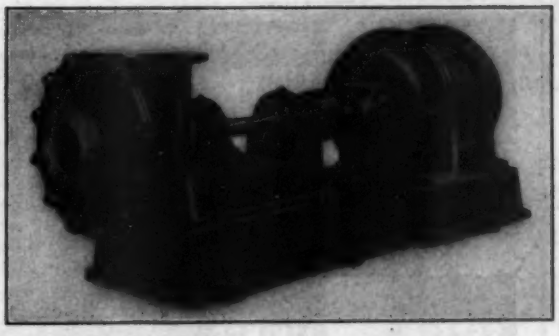

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Control of Paper Expansion in Multicolor Lithography

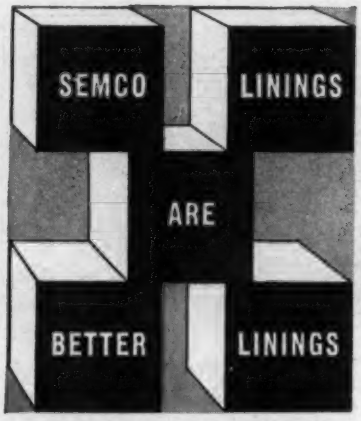
CHARLES G. WEBER,
Assistant Chief of Paper Section,
U. S. Bureau of Standards

For several years, the factors which affect the register of successive color images in multicolor offset printing have been under study at the National Bureau of Standards.

The research on offset papers is carried on in the paper section of the Bureau with the co-operation of the Lithographic Technical Foundation, and with the assistance of a fund deposited with the Foundation by a group of manufacturers of offset papers. Also, the work has benefited from the co-operation of the Printing Division of the Coast and Geodetic Survey where experimental printings are made under controlled atmospheric conditions. The studies are planned with the counsel of an advisory committee of technical representatives of the sponsors under the chairmanship of Professor R. F. Reed, Director of Lithographic Research, University of Cincinnati.

In multicolor lithography, the effects of expansion of the paper are probably more serious than in any other printing process.

Normally, paper that has been conditioned to adjust its moisture content to equilibrium with the atmosphere will remain unchanged in dimensions as long as the relative humidity and temperature are kept constant. Unfortunately, that is not the case in offset printing. In that process, water is used on the plate, and absorption



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of water from that source will result in expansion, even under the best conditions of atmospheric control, unless the paper is given special conditioning before printing the first color.

It has been found possible to adjust the hygrometric condition of the paper, so that it will lose moisture to the atmosphere during printing at the same rate that it absorbs moisture from the press, thus preserving a balance. This will occur in a conditioned pressroom if a small excess of moisture, to bring the moisture content above equilibrium with the surrounding air, is added to the paper in its preparation for the first color printing. When printing with a normal amount of water on the plate, the excess moisture required has been found to be 0.5 per cent or slightly more (Weber, C. G., & Geib, M. N., Treatment of Offset Papers for Optimum Register, Journal of Research, Nat. Bureau of Standards *16* No. 2; 93, 1936. RP859). When it is not provided by accurate adjustment of the moisture by the manufacturer, the excess can be introduced by conditioning the paper to equilibrium with an atmosphere having a relative humidity 5 to 8 per cent above that maintained in the pressroom.

Recently, improved practice for conditioning the paper (to the correct hygrometric state to insure satisfactory moisture stabilization during multicolor printing) was developed by the Bureau.

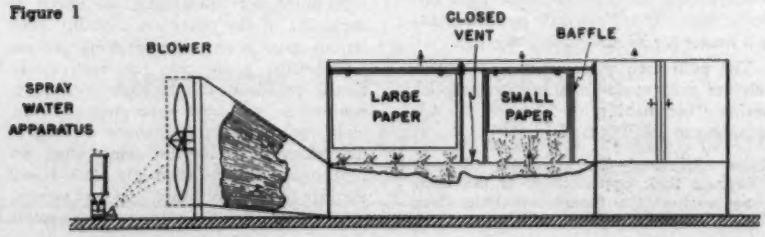
The new method of conditioning to give the paper the optimum moisture content consists essentially in adding water in measured amounts to the paper while it is being conditioned. It is done by mixing the moisture, in finely-divided form, with the air to which the paper is exposed in a conditioning machine. It is applicable to any type of machine that operates on the principle of blowing air over the paper, arranged in hangers for maximum exposure. The moisture is added by means of atomizer nozzles which spray it into the air entering the blower. By this method it is entirely feasible to bring paper to the desired condition by first determining the moisture deficiency with the sword-type of paper hygroscope, (Reed, The Paper Hygroscope. Sales Bulletin No. 1, Research Series No. 6, Litho. Tech. Foundation, 1931) (Reed, Modern Paper-Conditioning Methods and the Paper Hygroscope. Tech. Bull. No. 1, Research Series No. 9, Litho. Tech. Foundation. 1937) then adding through the sprays, the amount of water necessary to make up the deficiency.

Figure 2

After the required amount of water has been computed, the paper is placed in the machine, and one-half the water is added to the air stream entering the circulating fan. The paper should then be reversed end for end in the hangers and the remainder of the water added.

The results obtained by this method of conditioning will depend largely on the efficiency of the machine and its operation. It is important that spaces between the ends of the sheets of paper in the racks and the ends of the paper compartments be closed by the use of baffles to prevent escape of the air around the ends of the paper. All air vents not directly under the paper should be kept closed. These points are illustrated in Figure 1.

Figure 1



When the paper has been conditioned, the sword reading showing its hygrometric state relative to the *pressroom atmosphere* should be as shown in Figure 2.

This method of conditioning has been highly successful in commercial operation at the Coast and Geodetic Survey for more than a year. It has resulted in better conditioning than was heretofore possible and the capacity of the conditioning machine was more than doubled by increasing the rate of conditioning.

Performance of Streamflow Vat System on Ninepoint

J. R. BUCHANAN, General Manager
The Harriman Company

Chestnut ninepoint is made from leached chips after tannic extract has been removed. These chips are then cooked in rotary digesters by a semichemical process and defibered by attrition mills and by jordans. Chestnut stock is brash, harsh, and untreated, but on the other hand due to its extreme shortness it is resistant to drainage on the machine. It is therefore difficult to lower the consistency to a point where good dispersion of fibers before formation can be obtained. Due to these peculiarities this type of stock has a marked tendency to clot, mottle, and streak.

The mill in question was a typical example of an operation whose bottleneck was the formation of the sheet. Speeds above 325 f.p.m. were impossible without a formation too blotched to be salable. At the same time, the stock had to be extremely slow at the vat inlet to form decently. This in turn required the use of large quantities of makeup water and the spilling of many fines out of the system. The resulting sheet was brittle. Weight variation across the machine was large (averaging about 14 per cent) in spite of constant manipulation by the machine tender.

The stock had to be prepared for formation rather than for the sheet characteristics desired. It was recognized that if it were possible to form a wider range of stock freenesses acceptably, the quality of the sheet might be much improved, production increased, and costs lowered.

To remove the formation bottleneck a study was made of the various types of equipment available. It was decided to install a Goldsmith streamflow vat system [Goldsmith, P. H., "The Streamflow Vat System," *Tech. Assoc. Papers* 23:343-347 (June, 1940)]. This new wet end was started up in September, 1940.

When the machine went into operation with this new system, it quickly became evident that the formation bottleneck had been removed. The speed of the machine was quickly brought up to driving and drying limitations and has been operating at those speeds ever since. Where formation had not permitted speeds higher than 325 f.p.m. previously, superior formation is now obtained at a regular speed of 360 f.p.m. Tonnage has been increased approximately 10 per cent.

While it is too early to give a final judgment, all indications such as physical tests, corrugating trials, and customer reactions show that the sheet is definitely

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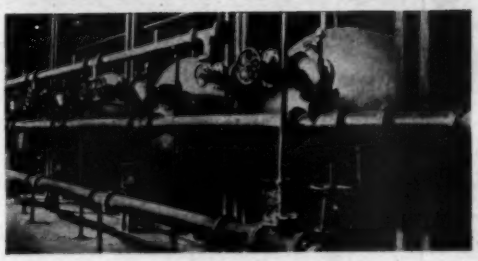

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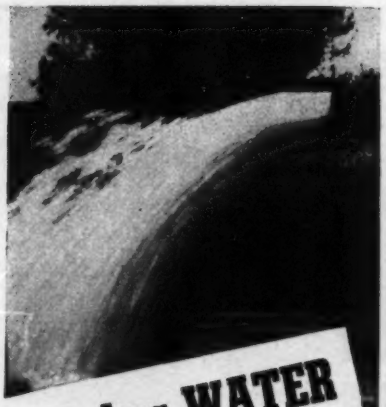

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superior to that previously made at the lower speed.

The stock is much freer than it had been possible to run before. The stock can now be prepared to suit the sheet rather than formation. Incidentally while it is too early for definite figures this must permit some reduction in stock preparation power per ton or cooking time or both. The capacity of the mill is thereby increased. The freer stock also makes an easier drying sheet. Much less fresh water is necessary than formerly was needed. This perhaps is due to the necessity of getting rid of the many fines in the over slow stock. This saves stock as well as water. The sheet is now automatically level (within close limits) where average variations previously were about 14 per cent.

A comparison of operating data for the old vat part and the streamflow vat system is given in Table II.

TABLE II

	Old Vat Part	Streamflow Vat System
26 lb./M sheet, f.p.m.	310-325	355-365
Freeness after jordans	130	185
Freeness vat inlet	115	275
Mold head, inches	19	32
Drainage, g.p.m.	1250	2500
Fresh water, g.p.m.	1100	700
Weight var. across, lb./M.	about 4	less than 1
Weight, variation, %	14	3.5
Power per ton, kw. hr.	391 approx.	327 approx.
Burst factor	16.5-17.0	16.5
Tear, cross direction	69	70
Tensile, machine direction	8.4	8.85
Tensile, cross direction	3.9	3.9
Stretch, machine direction	1.35	1.35

Conditioning Water with the Spaulding Precipitator

ESKEL NORDELL, Technical Department
The Permutit Company

Designs of Spaulding precipitators are similar to an inverted frustrum of a cone, square, rectangular, and double decker. In all of these, the portion through which the treated water rises has sloping sides so that the cross-sectional area increases upwardly. This increasing cross-sectional area means a constantly decreasing upward velocity of the treated water, and therefore this assures the most efficient settling of the precipitates formed by the treatment.

These designs may be applied to many existing reaction and settling basins or tanks of the older type thus converting them to Spaulding precipitators with consequent increases both in efficiency and capacity. In the case of tall tanks, conversion to the double deck design is often applied as this very obviously doubles the settling and drawoff areas.

With the precipitator, various degrees of calcium and magnesium hardness reduction may be obtained by varying the dosages of chemicals employed. For instance, where a hard water is warmed, calcium bicarbonate alone is responsible for scale formation. This is often the case with screens, deckers, recirculating equipment, pumps, screens, condensers, cooling jackets, etc.

In such cases, of course, where the scale consists of calcium carbonate, removal of the other hardness constituents is not only unnecessary but constitutes a needless operating expense. Therefore, in such cases, the water is treated with just enough lime to reduce only the bicarbonate hardness to a point at which it will not form the troublesome calcium carbonate scale. This point is approximately 2 grains per gallon or about 35 p.p.m. of calcium bicarbonate alkalinity.

Since the sludge produced consists almost entirely of calcium carbonate, recovery of the added lime plus that precipitated from the water may be practiced and this greatly reduces treatment costs. Considering only the calcium bicarbonate removal, the amount of lime recovered from the sludge is twice the amount of lime added because each equivalent of lime added is not only precipitated but it precipitates an equivalent amount of lime from the water.

By using larger dosages of lime, removal of the magnesium, as the hydroxide, may be effected. By adding soda ash, as well as lime, removal of the non-carbonate hardness as well as the bicarbonate hardness may be effected.

Therefore, by varying the treatment, various degrees of hardness removal may be effected down to a practical limit of somewhat less than 1 grain per gallon or 17 p.p.m. The size of the precipitator remains the same for all of these various softening procedures, because the governing factor in determining its size is the flow rate and not the hardness of the raw water nor the degree to which it is to be softened.

Besides being used for softening water, the precipitator is employed for the removal of turbidity, color, taste, odor, and silica. Its value in removing these constituents lies largely in that the intimate contact afforded utilizes to the full extent the coagulating and adsorbent powers of the treating materials employed and that the upward filtration and settling obtained yields a clearer effluent than the conventional type of equipment.

Tastes and odors in water are often due to minute amounts of oily materials derived from organic growths. Activated carbon is widely used for the removal of tastes and odors and is usually applied, in powdered form, to the water in the settling basin.

When so applied it sinks into the sludge before its adsorptive powers have been fully used. When used in the precipitator, it has been found that its adsorptive powers are more fully utilized.

With the advent of high-pressure boiler

plants, silica removal has come into prominence as a means of preventing the formation of silica scale. The removal of silica is accomplished by means of the adsorptive powers of various hydrated metallic oxides such as those of magnesium, iron, and aluminum. In these processes, it has been found necessary to use a fairly large initial amount of sludge to which small dosages of fresh adsorbent are continuously added and corresponding amounts of used sludge continuously withdrawn.

The precipitator, due to the prolonged and intimate contact afforded both in the mixing chamber and the semi-suspended sludge blanket, has been found particularly applicable for silica removal.

Bacteriological Technique for Studying the Degradation of Felts

JOHN W. APPLING,[1] OLGA A. SMITH[1] and DOUGLAS FRONMULLER[1]

Woolen felts suffer degradation as the result of mechanical, chemical, and biological agents. The degree to which these agents can be controlled affects the life of felts on the machine. The biological degradation includes the destructive action of certain forms of bacteria, molds, algae, and insects. The action of bacteria on woolen felts has been investigated by various workers; however, the technique used has not been standardized. The present study is the beginning of a series of investigations whose first objective is to standardize the bacteriological technique used. It is hoped that these investigations will lead to a much better understanding of the mechanism of bacterial degradation of felts as well as how to prevent it most effectively.

In 1939, Smith (Smith, Olga A. Unpublished work, The Institute of Paper Industry, 1934-1940. Part of this work is now published through the courtesy of the Appleton Woolen Mills.) isolated 23 apparently different species of bacteria from a set of damaged felt samples submitted to The Institute of Paper Chemistry. So far as it was possible to identify these bacteria, this was done with the result that 17 were fairly well identified and the remainder could not be classified satisfactorily. With the exception of *Bacillus subtilis* none of these has been reported previously as having been isolated from damaged felts. The list is as follows:

Streptococcus lactis
Staphylococcus albus
Rhodococcus rosaceus
Sarcina lutea
Pseudomonas aeruginosa
Pseudomonas fluorescens
Alcaligenes bookeri
Alcaligenes faecalis
Escherichia coli
Proteus vulgaris
Bacillus (6 species, namely, *albus, megatherium, mycoides, niger, subtilis,* and one unknown species)
Actinomyces (1 species)

In 1940, Smith (Smith, Olga A. Unpublished work, The Institute of Paper Chemistry, 1934-1940. Part of this work is now published through the courtesy of the Appleton Woolen Mills.) isolated from a set of damaged felts 9 species of bacteria which produced marked degradation on test strips of felt as measured by the reduction of tensile strength and as indicated by the color, odor, and appearance under the microscope. These species were identical to 9 which were listed under the 1939 isolations.

Weidner [Weidner, John P., *Paper Trade J.* 110, no. 19:36-38 (May 9, 1940); *Pacific Pulp Paper Ind.* 14, no. 4:25 (April, 1940); *Tech. Assoc. Papers* 23:416-418 (June, 1940)] reported certain mill studies involving the disinfection of felts during normal operation and just prior to shutdown periods. Dowicide G (sodium pentachlorophenate) was found to be the most effective Dowicide used. Wet felt life increased from 10 to 60 per cent and pick-up felt life from 30 to 100 per cent while these treatments were in progress. Bacterial degradation was believed to have been responsible for the short felt life prior to the treatments.

Last summer experimental work was begun by the senior author of this paper on developing a standardized bacteriological technique for studying the biological degradation of felts. It was believed that tensile strength could be used as a criterion of the bacterial degradation of felt.

A systematic study of every conceivable factor which might influence the inoculated felts was considered necessary in order to standardize the tensile test.

Based on previous experiences and on the type of tensile tester available, it was decided to standardize the test strips by cutting and trimming them from new felt approximately 5 inches long in the warp direction and 2 inches (± 2.0 per cent, which corresponds to one half the diameter of the thread) in the woof direction. Four test strips constituted a set for a given series of sterilization or incubation conditions and the average tensile strength for four strips served to minimize any abnormal effects due to the quality and weaving of the felt.

An important and hitherto unsuspected factor appeared when various sets of control felt strips were compared. Felt strips which were wetted prior to sterilization suffered a loss in tensile strength of about 32 per cent, whether incubated or not, whereas felt strips which were sterilized dry and kept dry suffered a loss in tensile strength of about 5 per cent. When dry sterilized felts were wetted and incubated, the loss in tensile strength was nearly 14 per cent. The wetted felt strips probably suffer a chemical degradation upon sterilization and, as a result, they become more susceptible to bacterial degradation.

Sterilization of wetted felt strips for 30 minutes instead of 20 minutes increased the tensile loss for the control strips but not for the inoculated strips. The liquid used for suspending the bacteria, influences their effect on the test strips. If dilute sus-

(1) Research Assistant, the Institute of Paper Chemistry.

Side-loader Model PS—An especially designed Skid-Em-On for mills with crowded facilities. This model hauls the rolls endwise.

Skid-Em-On

PAPER ROLL TRUCK

The Skid-Em-On truck, designed especially for the handling of paper rolls, not only cuts cost but actually speeds up handling operations because in most cases only *one man* is needed to load and operate it. This simple yet sturdy truck, made in many styles and types, requires no tugging or lifting of the rolls, no back-breaking labor.

Skid-Em-On trucks are really combined loaders, carriers and unloaders. They eliminate rehandling and save time in loading, carting and unloading. They also eliminate the damage that is caused by the use of pinch bars or make-shift loading devices. According to reports from users, Skid-Em-On trucks save as much as 28 per cent in the cost of handling paper.

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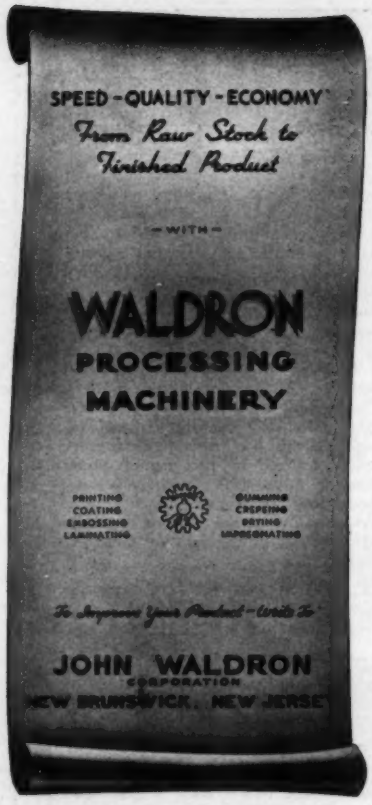

pensions (1000-3000 bacteria per felt) are used, the data indicate that the bacteria should be suspended in nutrient broth.

While the technique has not been completely standardized at present, sufficient data have been obtained to indicate the best procedure for continued study. The technique will be described briefly at this point: the test strips are cut and trimmed from new felts approximately 5 inches long in the warp direction and 2 inches (± 2.0 per cent error) in the woof direction. Each strip is then saturated with tap water and transferred to a large Petri dish. Without stacking these dishes containing wetted strips, they are heated 20 minutes under 15 pounds of steam pressure. The suspension of bacteria is made in nutrient broth from 24-hour agar slant cultures of the test organism and adjusted to a concentration of approximately 200 bacteria per cc. Each sterile felt, except the control set of felts, receives 10 cc. of the bacterial suspension well distributed over its surface and then 5 cc. of sterile distilled water. The inoculated felts are incubated at 37 deg. C. for 3 days when they are turned over asceptically and 5 cc. of sterile distilled water are added. After a total incubation time of 7 days, the felts are removed, rinsed carefully 4 times in tap water, labeled, and dried by hanging them for 1.5 hours in a hot-air oven maintained at approximately 100 deg. C. The dried felts are kept overnight in a constant humidity (65 per cent relative humidity) constant temperature (70 deg. Fahr.) room. The dry tensile strength is obtained by means of the Amsler tester, using the small ram, the 4000-pound scale and operating at a speed of 2.75 inches per minute.

The authors plan to continue the use of the above technique, or minor modification of it, for studying various phases of biological degradation of felt. They are certain that much information will be obtained by the systematic application of a standardized technique, any factor of which can be varied at will.

Moisture Content and Regain of Coated Papers

J. D. DAVIS, Technical Director
Dill & Collins, Inc.

Over the past five to six years a number of papers have been published showing results of tests on the moisture content of paper at equilibrium with various relative humidities, on the hysteresis effect arising from desorption and absorption, and on the rate of moisture gain or loss. All of this work has been concerned with uncoated paper, probably due to its more general use for offset printing where moisture is of primary importance. A number of coated sheets are being used at present for offset, and information as to the relative behavior of coated and uncoated paper is desirable.

The purpose of the work given in this paper was to determine the relation between uncoated and coated paper, and to check the results previously published on uncoated.

In running the tests an effort was made to work with conditions not too far removed from those encountered in the mill and, accordingly, the regain within the first 1 to 2 minutes was given the most attention. Mill operation was considered first, although the results are applicable to printing or converting.

In discussing equilibrium moisture content of coated sheets it is essential to know what effect satin white, if it is used in the coating color, has on the final results of moisture tests.

The satin white concerned here lost none of its water crystallization when dried at 40 deg. C. In drying at both 40 deg. C. and 100 to 105 deg. C., 34.8 per cent of the 40 deg. C. weight was lost at the higher temperature. Results of moisture tests run at 100 to 105 deg. C. on a large number of sheets with widely different satin white contents showed an average loss of 28.6 per cent between coater drier temperatures (approximately 60 deg. C.) and 100 to 105 deg. C. This figure is, of course, not at all accurate for widely different drying conditions, and applies only to the particular brand of satin white, but it may be useful as a check. For a 33.3 per cent coat, 10 per cent satin white in the coat would result in an increase of nearly 1 per cent in the moisture test.

Moisture tests on coating color, previously dried, have shown that the caseinate present contains approximately 8 per cent moisture at 50 per cent relative humidity. Assuming 33.3 per cent coat and 10 per cent casein in the color, there would be 0.3 per cent moisture present.

Calculated results show that for the same coat weight a 120-pound sheet should contain 0.75 per cent more moisture than does a 70-pound sheet. Good results have been obtained in actual tests when using the calculated factor.

The majority of the tests were run on 80- and 100-pound (25x38) C2S sheets, 70-pound C1S, and base stocks used for these weights. Different grades were included to determine the effect of the type of coat.

The difference between the initial and the final moisture content has a large influence on the rate of moisture regain. In fact, it is the largest single factor found under normal conditions. With a total regain of 4 per cent there is a pickup of 0.5 per cent moisture within 10 seconds while for a total regain of 2 per cent it amounts to 0.3 per cent. With some conditions that are occasionally encountered in the mill during the summer, a total regain of 0.4 per cent is possible within 5 seconds and for 20 seconds exposure this could amount to 1 per cent.

Tests on sheets ranging from 80 to 120 pounds show that the lighter sheets pick up moisture more rapidly during the first 2 to 3 minutes than do the heavier ones. Due to the greater percentage of base stock, the heavier ones finally pick up more. The maximum difference at 10 seconds for an 80- and a 120-pound sheet is 0.1 per cent, which is not large. The difference in the total pickup is about as calculated from the base stock-coat weight ratio.

Several sheets with different coats containing varying amounts of clay, satin white, and calcium carbonate were compared. It was found that no consistent differences were present.

Base stock picks up moisture more rapidly than does C1S, which is followed by C2S. The difference in total regain is about as calculated from the base stock-coat weight ratio. The rate of pickup of the base stocks is similar to results obtained by Larocque [Larocque, G. L., *Proc. Tech. Section, Can.* 36-42 (1937)] and Weber and Snyder [Weber, C. G., and Snyder, L. W., *J. Research Bur. Standards* 12, No. 1:53-65 (Jan., 1934); Research Paper 633] for various uncoated papers, when the total regain is taken into consideration. While the regain of C2S is slower than for uncoated, it is nevertheless sufficient to be of importance wherever an accurate and controlled moisture is desirable.

An extensive study of the effect of the velocity of air in contact with the paper was not made, but the results obtained indicate the importance of this factor.

The velocity of air in the mill is usually greater than that under which the tests were run, due to the motion of the sheet if nothing else, and the rate of pickup must be somewhat higher. This factor appears to be of second importance in determining the rate of pickup as long as the velocity is not too close to zero, and then it is first.

An examination of curves obtained by running tests at frequent intervals of exposure up to 24 hours showed that equilibrium was usually reached within 3 hours and, in a number of cases, it was attained within 1 hour for C2S paper. Base stocks reached equilibrium in less than 1 hour, which agrees with results obtained by Weber and Snyder [Weber, C. G., and Snyder, L. W., *J. Research Bur. Standards* 12, No. 1:53-65 (Jan., 1934); Research Pa-

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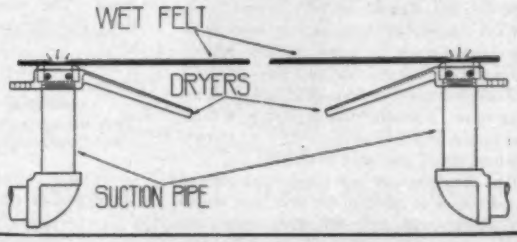

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per 633]. The time for half of the possible moisture regain is around 2 minutes for C2S sheets and from 1.25 to 2 minutes for base stock. Larocque [Larocque, G. L., *Proc. Tech. Section, Can.* 36-42 (1937)] found the half time for glassine, bond, and news to be 2.1, 1.0, and 1.2 minutes, respectively.

With conditions favorable to fast moisture regain, such as high velocity of air, low initial moisture content, etc., a great deal of moisture can be picked up within a short time. Five seconds exposure is common in the mill and as much as 0.5 per cent moisture could probably be picked up.

The equilibrium moisture content of coated paper is affected by the base stock-coat weight ratio, satin white, or other materials containing water of crystallization driven off at 100 to 105 deg. C., the hygroscopicity of materials in the coat, the initial moisture content, and all factors that affect uncoated paper.

The rate of moisture regain is highest for base stocks, followed by C1S and, finally, C2S. The initial condition of the sheet is the most important factor determining the rate, followed by the velocity of air. Basis weight is of some importance, while calendering and type of coat have no effect.

The regain within a few seconds can be sufficient to have a pronounced effect on succeeding operations, or on the quality of the finished sheet.

Equilibrium is reached within at least 3 hours for most C2S sheets and within about 1 hour for base stock. Time for half the possible moisture regain is around 2 minutes for C2S sheets.

Monel Jordan Bars

T. E. LAGERSTROM[1], F. P. HUSTON[1], and W. F. BURCHFIELD[2]

Practical experience with Monel jordan bars in paper and paperboard mills provides evidence of the usefulness of this non-rusting, corrosion-resistant and highly wear-resistant alloy.

The oldest record (A. C. Nielsen Company—Survey IN-104-JZ—Date 4/19/29-HM) comes from a mill producing rag-content bond, ledger, and writing paper.

Monel bars were installed in the first jordan in 1920. A second jordan was equipped in 1921, a third in 1923, and additional jordans in 1924 and 1930. The bars installed in 1924 were still in service in 1935 after 11 years of use, and others are still in service in 1940.

The comparative operating data and cost of the steel, bronze, and Monel fillings were investigated after the latter fillings had been in use for 7 years.

Annual savings effected by Monel fillings on Majestic jordans:

Monel	$204.14
Steel	$931.00
Bronze	$509.59
Saving each jordan:	$726.86 $305.45
Savings on the five jordans:	
Over steel (78%)	$3,634.30
Over bronze (59.9%)	1,527.25

Paperboard mills have been reluctant to install corrosion-resisting fillings because of their higher initial cost. Experience with fillings shows that these mills obtain the same advantages from Monel bars as are obtained by the paper mills.

One mill, for example, installed a Monel plug and shell filling in a jordan operating on alum-treated top-liner stock (*p*H 4.5 to 5). This jordan refines 25 tons of stock during a 24-hour day, 5 days each working week. The comparative annual operating costs and the savings effected in this jordan are:

Material costs	*Steel*	*Monel*
Plug filling including bars and woods	$116.00	$408.00
Shell filling including bars and woods	121.00	338.00
Total (1939 costs)	237.00	746.00
Average life of filling	5 months	In good condition after 19 months' service. (Estimated minimum total life 3 years)
Actual annual saving effected by Monel filling in first year of operation $630 less $481.36		$148.64
Estimated annual savings effected by Monel filling if anticipated minimum life of 3 years is attained $481.36 × 3 less $630.00 × 3		$445.92

Experience has shown that there is no one determinable property of a material which is outstanding as a measure of its probable suitability for jordan service. Obviously corrosion resistance is desirable, and the nature of what corrosion may occur should not be such as to aggravate mechanical effects, as by the development of stress raising pits or notches which are capable of leading to failures in fatigue. The material should not be susceptible to the combined effects of corrosion and either internal or applied stresses which may lead to cracking of vulnerable materials under conditions where the single effects of corrosion and stress should not be sufficient to cause failure.

The desirable mechanical properties include high strength, high ductility, and resistance to mechanical shock which is usually measured in terms of impact properties.

The mechanical properties of Monel fulfill the requirements of high strength, ductility, and toughness without an excessive response to work-hardening effects.

Acknowledgment—The assistance of the manufacturers of jordan fillings; in particular, the Appleton Machine Co., the E. D. Jones & Sons Co., the Noble & Wood Machine Co., and Shartle Brothers Machine Co., is acknowledged.

(1) Monel and Rolled Nickel Department, and (2) Research and Development Division, The International Nickel Company, Inc.

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"The paper mill we bought in 1867 has been running constantly, night and day (Sundays excepted), and in the whole three years, there has not been a single farthing expended upon it in the way of repairs."

"Your pumps show less wear than any type pump we have ever used. We consider our purchase fully justified, and will be glad to recommend MORRIS pumps to any one at any time."

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"Your pump has been in operation for a period of eleven months, operating twenty-four hours a day, and we have yet to install the first replacement part."

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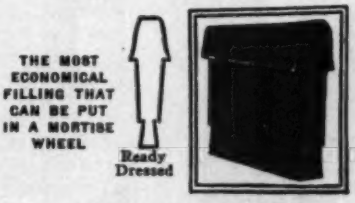

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NEW EQUIPMENT AND SUPPLIES

Sheave Puller

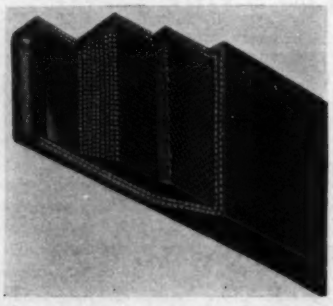
Owatonna Tool Company, Owatonna, Minnesota, has announced a sheave puller attachment for use with a Grip-O-Matic puller of its manufacture. The sheave puller attachment, according to the manufacturer, will pull all sheaves up to and in-

cluding 10 in. in diameter. The puller puts the strain down in the bottom of the sheave groove and distributes the strain evenly around a large part of the periphery.

The Grip-O-Matic puller incorporates a patented linkage feature which automatically holds the jaws in place on the work. It is furnished in seven sizes to accommodate a wide range of service.

V-Belt Improvements

Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, has announced that all of its Texrope V-Belts are now of the new "Super 7" laminated design, based on the Vogt formula and field experience. The cords in the new belts are smaller, permitting the use of more cords per belt with a resulting greater strength



and less stretch. Each cord is individually imbedded in heat dissipating rubber to reduce internal belt disintegration. The central cord portion transmits power at the effective pitch diameter. A bias cut fabric prevents dishing and assures transverse stability, and a 2-ply rubber-impregnated fabric prevents destructive agents from reaching the vital belt elements.

All-Steel Liquid Heater

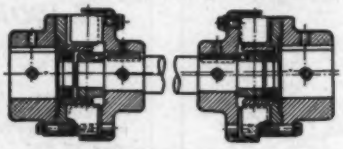
Johnson Corp., Three Rivers, Mich., has announced an all-steel heater to supplement its copper tube heater. In this heater, designated as the all-steel *"Instant" Heater,* two concentric smaller pipes are centered within an outer shell of heavy wrought steel pipe so that a steam chamber is formed between the outer wall of the smaller pipe and the inner wall of the surrounding pipe. The liquid being heated is admitted to the central pipe, where it encounters a spiral baffle which creates turbulence and increases the length of liquid travel in contact with the heated wall. The liquid then passes into the outer chamber, reversing its travel through the heater and during which time another spiral baffle multiplies its length of travel and velocity along the surface of the hot steam chamber. Removable cast iron heads permit disassembly for inspection or

cleaning. In addition to steam inlet, liquid inlet and liquid outlet, there are two drain outlets—one for steam condensate, the other for liquid.

The heater, available in a wide range of sizes, according to the manufacturer, can be used for heating water, various process liquids and oils, for booster service, for pre-heating boiler feed water, and for many other applications.

Floating-Shaft Coupling

A floating shaft coupling, designated as *L-R Type HKQ,* has been announced by the Lovejoy Flexible Coupling Co., 5009 West Lake St., Chicago. In the application of this coupling, the floating shaft is supported in fixed bearings, independent of the power-transmitting elements; and chatter caused by endwise impact of the float-



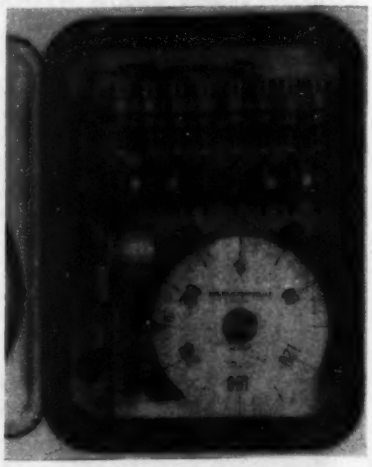
OPERATING ASSEMBLY

ing shaft against the fixed shaft is prevented by cushions, free oscillation of the floating shaft in upright as well as horizontal applications being assured. The coupling is made in standard sizes with bores from 1½ in. to 8½ in. (700 to 800 hp. at 100 r.p.m.) for various distances between fixed shafts, and for handling extreme misalignment.

Time Cycle Controller

The Bristol Co., Waterbury, Conn., has announced the development of a multiple-cam time cycle controller, known as *Model A-118 Impulse-Sequence Cycle Controller,* for timing mechanical operations in industrial processes. In this controller, time measurement and pilot valve operation are handled by separate mechanisms. Timing is accomplished by a Telechron-driven aluminum disc on which is printed a 25-inch scale. The desired schedule of operations is incorporated into the controller by punching holes with an ordinary ticket punch on the time scale. The location of these holes determines the time of operation of the cam mechanism. Discs for new cycles or schedules of operation can be easily made.

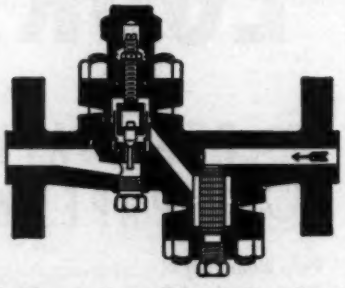
The cams are individually adjustable and their setting does not require fine adjustment in order to get accurate results. Any sequence of operation can be obtained.



All controllers are drilled for eight cams and pilot valves. Additional cams and pilot valves up to a total of eight can be easily added by the user to controllers originally made up with less than eight cams.

High Pressure Steam Trap

A high pressure steam trap, designated as the *Superpressure Trap,* has been announced by Yarnall-Waring Co., Chestnut Hill, Philadelphia. The trap is built for steam pressures up to 1500 lb. and temperatures at 900 Fahr. An important feature of the trap, according to the manu-



facturer, is the positive closing of main valve in the presence of wet, saturated, or superheated steam. Likewise, the manufacturer states that pulsating or varying pressures will not interfere with its operation.

Bulk Conveying System

A bulk conveying system, known as the *Bulk-Flo,* has been announced by the Link-Belt Co., 307 N. Michigan Ave., Chicago, for the positive and continuous conveying of flowable granular, crushed, ground, or pulverized materials of a non-corrosive, non-abrasive nature. The system is designed for any capacity from one to 140 tons

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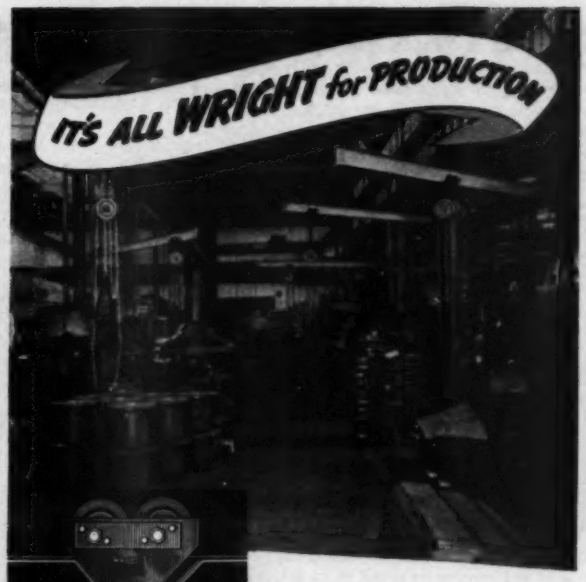

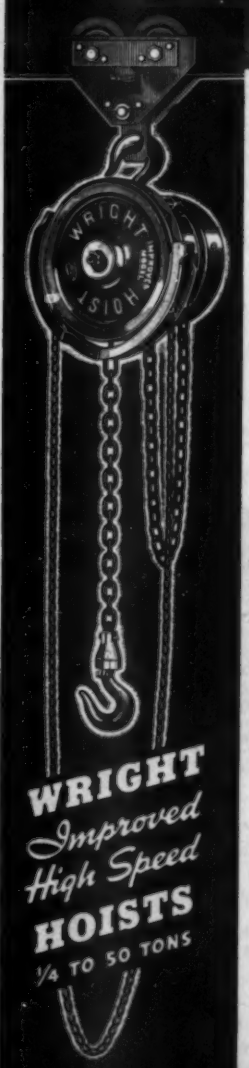

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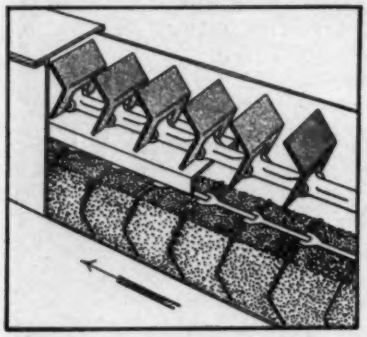
per hour. The conveying medium, operating within a dust-proof casing, employs a specially designed chain, usually malleable iron, to which solid peak-top flights are rigidly attached at every pitch. These flights divide the material into a continuous series of batches, moving them along almost any desired path—horizontal, inclined, ver-



tical, or curvilinear. A single self-contained unit may carry in all these directions in the same vertical plane.

Feed and discharge openings, also openings for inspection and access, are provided in the casing according to the requirements of the individual installation.

The system is self-feeding and clearing; and operates from 10 to 80 ft. per minute.

Respirator Goggle

Bausch & Lomb Optical Co., Rochester, N. Y., has announced a metal frame spectacle goggle, designed to provide complete eyesight protection for workmen engaged in operations where respirators must be used, but where the hazard is not great enough to require a complete helmet. The construction provides a lightweight, rigid

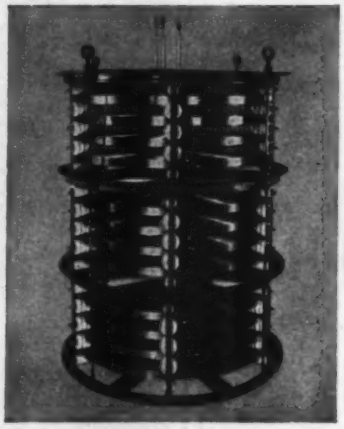
frame and includes a variety of sizes. The goggle is offered with wire mesh, or with either clear or green acetate nose and side shields, and with either plano or prescription hardened lenses.

Machine Vibration Insulators

The B. F. Goodrich Co., Akron, Ohio, has announced three new insulators of rubber and metal construction *(Vibro-Insulators)* for decreasing vibration and noise in machinery. The insulators, listed as Types 14, 33, and 36, are for general application and for mounting loads of 80 to 250 pounds. Types 14 and 36 can be applied both to compression and shear mountings; Type 33, only to compression mountings.

Electric Immersion Heater

H. O. Swoboda, Inc., 164 Thirteenth St., New Brighton, Pa., has announced an electric immersion type booster heater for maintaining and increasing temperatures of materials having electrical insulating properties (non-conductors). The heater,



known as the *Falcon,* consists of spirally coiled heater strips arranged to form a compact unit, together with an automatic control mechanism, either thermostat or pyrometer with thermocouple, for maintaining uniform temperature. Capacities of the heater range from 10 kw. to as much as 1000 kw. output.

The manufacturer suggests the heater for application in many coating and saturating processes involving the use of heated asphalts, oils, paraffins, waxes, resins, creosote, varnishes, etc., the unit being installed in a sealed tank built in the pipe line between storage vessel and coating or saturating tank.

Safety Extension Light

A portable trouble light with socket sealed against the entrance of moisture, water, dust, and chemicals has been developed by Safeguard Electric Co., Inc., 1 DeKalb Ave., Brooklyn, N. Y. The device

has a rubber handle to which a metal cage is attached by means of a rubber locking ring. A rubber shoulder projects from the top edge of the handle. The socket, which also is of rubber, has a lip for sealing the bulb when screwed in it. These features together with others incorporated in the assembly of the light, according to the manufacturer, permit the entire guard, with lamp burning, to be completely immersed in water without danger of short circuiting.

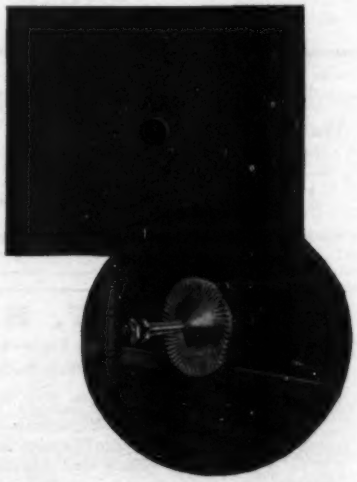
In re-lamping the light, it is simply necessary to snap the rubber ring back, re-lamp, then snap the ring into place.

Sulphide Testing Set

The LaMotte Chemical Products Co., Towson, Baltimore, Md., has announced a new outfit for determining total sulphides, dissolved sulphides and hydrogen sulphide in sludge, air, and gases. Known as the *LaMotte-Pomeroy Sulfide Testing Set,* the outfit includes sampling pipettes, test tubes, solutions, flocculating bottle, set of instructions, and a wooden carrying case.

Air Washer

D. J. Murray Mfg. Co., Wausau, Wis., has announced an air washer which is designed to meet special mill requirements for cleaning air. Designated as the *Murray Air Washer,* the device embodies the patented Murray spray wheel, which, according



to the manufacturer, does not clog with sediment or particles in the water, and is self-cleaning at all times, the spray film being produced fine, medium, or coarse to meet specific applications. Each installation is engineered to the particular mill requirements.

Flameproofing Agent for Paper

An odorless, non-toxic water-white liquid, designated as *Flameproofing Agent 361,* has been announced by Glyco Products Co., Inc., 230 King St., Brooklyn, N. Y. The material, recommended by the manufacturer for the flameproofing of paper, mixes readily with cold water, may be applied by dipping or spraying is non-hygroscopic, and does not dust off following application.

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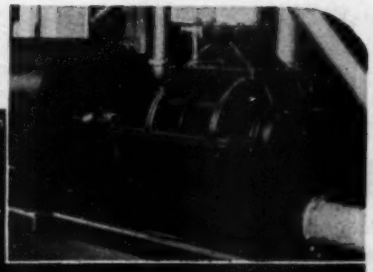

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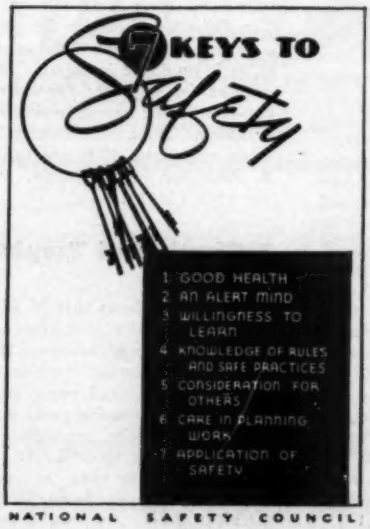
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3 WILLINGNESS TO LEARN
4 KNOWLEDGE OF RULES AND SAFE PRACTICES
5 CONSIDERATION FOR OTHERS
6 CARE IN PLANNING WORK
7 APPLICATION OF SAFETY
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TECHNICAL DEVELOPMENTS

The following abstracts are of the latest developments found in the foreign press.

Type of Bleach and Its Effect on Sizing

Using practical sizing tests, and applying them to commercial sulphite pulps that had been bleached with calcium hypochlorite and with chlorine water, indicated that the former showed a better "sizeability" than did the latter. Laboratory samples of pulp confirmed this. Here a specific sulphite pulp, made under carefully standardized conditions was bleached (1) with hypochlorite alone, and (2) with chlorine water, followed with an intermediate treatment with aqueous NaOH, and washing with hot water, and finally with an after-bleach of hypochlorite. It was (2) which showed the poorer sizing of quality. There is no evidence that this difference in sizeability is correlated with per cent wood gum, pentosans, or with the chlorine content of the pulp, but rather with the water soluble organic matter, which can be removed at 98 deg. C. by means of a water extraction. The sizing properties are better, the more of this organic matter remains in the pulp. Its removal interferes with subsequent sizing, and it accounts for the inferior properties of the so-called "chlorinated" pulp, which had been washed, after alkali treatment, with hot water. Pulps treated only with hypochlorite, when extracted with hot water, showed a marked decrease in sizing quality. If this water extract was evaporated and added to the pulp, the sizing quality was apparently restored to its original value. (These data were obtained by flotation and pen-and-ink tests on the various sized sheets.) With chlorinated pulps, however, subsequent hot water extraction had no appreciable effect on the sizeability. No clue is given regarding the substances removed in the water extract. The authors give detailed directions for pulping, bleaching, and the analytical methods used. F. Burgstaller and R. Sonderhoff. Wochbl. Papierfabr. 72, 75-9, 85-9 (1941).

Total Hydrolysis as an Aid in Gauging Viscose Pulp

Claiming that the usual physical and chemical tests are not always sufficient in judging whether or not a pulp will be useful in the manufacture of cellulose wadding and rayon silk, the author proposes to hydrolyze the pulp and determine the ratio of the sugars thus formed, using this as an auxiliary test. Not only was this done with original pulp, but at various stages in the conversion process. The acids used in the hydrolysis were 72% sulphuric and 40% HCl, and special precautions must be taken since both of them cause degradation or chemical changes in the sugar mixture. The sugars are largely glucose, mannose, and xylose, listed in the order of sensitivity to acid attack. Xylose is determined on the pulp itself without previous hydrolysis, by using 13.5% HCl in the presence of NaCl and distilling off the furfural formed. Mannose, which is usually present in relatively small amount, is readily affected by acids at 20 deg. C. For example at this temperature, 72% sulphuric acid causes a total conversion of pure mannose within 72 hours, so that the usual mannose tests are negative. At minus 10 deg., however, only 10% of the mannose is destroyed in 20 hours.

Other precautions in carrying out the determination of mannose are described. Where very small amounts of this sugar are present in the hydrolyzate, it is well to add weighed amounts of pure mannose, and then allow for this addition in the final computation. Ordinarily, purified pulps which serve well in viscose manufacture may be dissolved to give clear solutions in 40% HCl, and, when diluted, these mixtures give very slight precipitates. Impure pulps on the other hand yield dark brown precipitates. Spruce pulps which retain appreciable quantities of mannans lend themselves satisfactorily to viscose manufacture. Beech pulps with high xylan contents on the other hand may give trouble. The author points to one straw pulp which by special processing contained 97% alpha cellulose, and less than 1% wood gum, and on which the data for swelling were no gauge of its very satisfactory behavior in viscose manufacture. The author also presents graphically (in 18 figures) results with various pulps and pulp fractions, and the changes effected at different points of the manufacturing process in the ratios of glucose : mannose : xylose. For example analyses are given for alpha-, beta-, and gamma-cellulose in spruce pulp and these are compared with the sugar ratios in the hydrolyzate of this same pulp. Similar data were obtained for the isolated alpha fraction. Beta cellulose fractions from different pulps vary widely on hydrolysis, depending greatly on their origin. Norway spruce beta cellulose gave nearly 80% glucose. Beech pulp beta-cellulose yielded over 75% xylose; while straw pulp beta-cellulose yielded over 90% xylose. The mannose contents of these beta-fractions were always low in mannose, the highest being found in the fraction from spruce. Ordinarily, in a pine, spruce and straw pulp that is being converted to cellulose wool, the glucose in the hydrolyzate increases as the conversion progresses. Samples were hydrolyzed after alkaline treatment (before and after ripening), and again in the finished product. There is a noticeable decrease in xylose, while the mannose changes are indefinite, and of no special significance. There does not seem to be any definite relationship between wood gum and xylose in the various fractions. The removal of xylans from pulp by successive extractions with pure aqueous NaOH has been studied, and it varies greatly with different straw pulps. It is also important that these alkaline steeping liquors do not contain too great an amount of hemicellulose, since it is possible that xylans are actually taken up from such liquors by the cellulose. The effect of bleaching on the xylan content of straw pulps has also been investigated. Hugo Koch. Papier-Fabr. 39, 46-56 (1941).

Sulphite Pulp as a Substitute for Sulphate

The author made a very extensive study in which the properties of various sulphate and sulphite pulps were compared. Tests, thousands of which were made, and only a fraction of which are reproduced in the tabulated data, include tear, stretch, folding endurance, Elmendorf number, and bursting strength, which were determined before and right after drying at 100, 125, 150 and 175 deg. C., and also after these heated samples had been reconditioned (as far as possible) on exposure in a humidity room. Results show very wide fluctuations, but there are definite trends. In general, sulphite pulps are far more sensitive to heat than are sulphate pulps, and some of the properties suffer more permanently than do those of sulphate pulp. This is brought out especially at temperatures of heating to 125-150 deg. C. This is especially true of folding endurance. Directly after heating to 100 deg. C., sulphite pulps have a folding endurance of approximately zero. Sulphate pulps still show some folding endurance. The differences between the two pulps is such the author feels that for certain purposes it would be inadvisable to substitute sulphite for sulphate; for example, when papers are to be impregnated at higher temperatures. The present findings are in harmony with those of Brecht and Michaelis. B. Possanner von Ehrenthal. Papier-Fabr. 39, 21-7 (1941).

Utilization of Tropical Forests

The author shows that in all continents there seems to be a shift, often a southward trend, of the pulp industry. He discusses various problems that confront the manufacturer of pulp and paper from tropical woods. An interesting point raised is that fiber length in the production of tropical hardwood pulps need not be a necessary requirement. He cites the case of balsa pulpwood, made up largely of *parenchyma* cells (55 μ by 275 μ) which give a strong sheet (tear length 13,140 m.; folding endurance No. 4740). This is ascribed to "wood gum." The author points to the possibility of cooking a mixture of species, using controlled alkaline cooks in such a way as to give pulps that can be bleached and used in papermaking. Here he is at variance with other men who have studied possibilities of using tropical forests. Roland Runkel. Papier-Fabr. 39, 29-33; 42-4 (1941).

WRITE FOR BULLETIN 241

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PAPERMAKING PATENTS

IN THE UNITED STATES—Compiled by James Atkins, Registered Patent Attorney

Inquiries should be addressed to James Atkins, Munsey Building, Washington, D. C.

Method of and Apparatus for Coating Sheet Material

Patent No. 2,229,921. Lindsay O. Goff, Westbrook, and Frederick H. Frost, Portland, Maine, assignors to S. D. Warren Company, Boston, Mass., a corporation of Massachusetts. Application April 23, 1938, Serial No. 203,930. 8 Claims. (Cl. 91—33). In an apparatus for coating a surface of a flexible sheeted material such as paper or the like with coating composition, of the class including means for continuously forwarding the sheet, means for applying a layer of mobile coating composition to a surface of the sheet while the same is being forwarded, and means for smoothing and leveling the layer while the latter is still mobile, the combination wherein the smoothing and leveling means consists essentially of a convexly curved confining surface the long axis of which is substantially transverse to and parallel with the plane of the sheet, said confining surface being co-extensive in width with the width of the sheet and forming with the latter a throat which is elongated in the direction of travel of the sheet and which is characterized in cross section by progressive longitudinal constriction from the ends toward the midpoint thereof, means to direct a stream of air under pressure longitudinally into said throat for passage through the most restricted portion of said throat and emission at the remote end of said throat, and tensioning means tending to move the sheet toward and into contact with said convexly curved confining surface.

Process of Producing Wood Cellulose

Patent No. 2,230,119. Fredrich Olsen, East Alton, and Lionel Goff and Lyle Melvin Sheldon, Alton, Ill., assignors to The Cellulose Research Corporation, East Alton, Ill., a corporation of Delaware. Application February 18, 1937, Serial No. 126,363. 4 Claims. (Cl. 92—11). The process of producing successive lots of purified unmercerized sulfite pulps comprising providing unbleached pulps by thoroughly boiling and impregnating wood chips with acid sulfite delignifying solutions at below active reaction temperatures, digesting said chips in said solutions to form pulps, defibering each of said pulps so that substantially no fiber bundles or mats remain, uniformly adding to said pulps in water slurries an amount of chlorine in water solution which will exhaust in from 10-30 minutes and treating the corresponding pulp at least until exhaustion of chlorine in each respective slurry, subjecting each of said chlorinated pulps to the action of a dilute caustic solution at elevated temperature and for a sufficient time within one hour to dissolve the chlorinated compounds therein and reduce the bleach values of said pulps to a substantially uniform level below 5%, treating said pulps with a hypochlorite bleach under conditions of concentration, time, temperature, pH and the like, attaining the desired purifying and decolorizing action and without exhausting the bleach, and terminating the bleach upon the attainment of the desired viscity reduction and before exhaustion of the bleach, and treating said bleached pulps with dilute caustic soda at greater than 50° C. for at least one hour, all of said treatments being carried out without substantial degradation of the pulp so that each pulp has an alpha cellulose value not less than 95% and soda solubility not greater than 4%, with maximum deviations therefrom in any lot of not more than 0.5% and a predetermined viscosity between 5—30 ctps. with maximum deviations of not more than 5%.

Paperboard Manufacture

Patent No. 2,234,457. Florian A. Strovink, Medford, Mass., assignor to Bennett Incorporated, Cambridge, Mass., a corporation of Massachusetts. Original application October 9, 1937, Serial No. 168,234. Divided and this application March 31, 1939, Serial No. 265,219. 10 Claims. (Cl. 92—39). In the production of a paperboard sheet designed to cleave apart most readily on predetermined internal planes, that method which comprises independently forming an internal ply of such paperboard sheet from papermaking stock containing a water-repellent cellulose-softening agent in amount ranging from about ¼% to 5% of its dry weight so as to yield a ply of relatively low ply adhesion, said agent being selected from a class consisting of oil and wax, independently forming the other and external plies of such paperboard sheet from well-beaten and sized papermaking stock capable of yielding plies of much higher ply adhesion, superposing and integrating all such plies while wet into a multi-ply paperboard sheet, and drying the resulting sheet.

Method of Producing Paper Filler

Patent No. 2,235,531. Joseph E. Plumstead, Wilmington, Del., assignor, by mesne assignments, to West Virginia Pulp & Paper Company, New York, N. Y., a corporation of Delaware. Application September 4, 1931, Serial No. 561,241. 14 Claims. (Cl. 23—122). The herein described method of producing calcium sulfate without requiring the use of calcium hydroxide, comprising adding calcium hypochlorite solution to a calcium bi-sulfite solution, to produce a calcium sulfate suspension in an acid calcium bi-sulfite solution, and filtering the acid calcium bi-sulfite solution from the calcium sulfate product.

The herein described method of producing a substance of improved qualities for use as a paper making filler or for other uses, comprising treating a suitable lime material with sulfur dioxide gas in the presence of water to produce calcium bi-sulfite solution, filtering and clarifying the calcium bi-sulfite solution to remove insoluble impurities, reacting the filtered clear solution with a pure milk of lime suspension to precipitate a calcium sulfite product and allowing the calcium sulfite suspension thus formed to stand for sufficient time for completion of the reaction and then making it slightly acid with additional material.

Paper Creping Machine

Patent No. 2,229,916. Peter J. Christman, Green Bay, Wis. Application November 3, 1938, Serial No. 238,695. 3 Claims. (Cl. 154—30). In creping apparatus, a frame, a pair of endless belts arranged one above the other, means carried by said frame for supporting said belts so that the inner portions of the belts are in adjacent relation and adapted to receive therebetween the paper strip to be creped, said belts each comprising separate coil springs which are stretched at one end of the frame and progressively contracted until they reach the other end of the frame, the springs of one belt being in staggering relation with respect to the springs of the other belt.

Process of Making Colored Paper

Patent No. 2,234,648. Herbert A. Lubs, Wilmington, Del., and Edwin R. Laughlin, Penns Grove, N. J., assignors to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware. Application September 14, 1937, Serial No. 163,800. 7 Claims. (Cl. 8—7). The process which comprises consecutively wetting a surface layer of a formed article of paper fibres with a solution comprising an azo dye coupling component and a solution comprising a diazotized aryl amine, and drying, the total acid remaining on the fibre before drying being not in excess of that which produces a combined residual mixture on the fibre which is neutral to slightly acid.

Pulp Screening Machine

Patent No. 2,230,647. Nelson M. Knight, Boston, Mass. Application July 9, 1938, Serial No. 218,381. 4 Claims. (Cl. 92—29). A pulp screen comprising a casing having a pulp inlet and a screened pulp outlet, a screen between the inlet and outlet, a screen-cleaning member formed with a plurality of blades situated on the inlet side of the screen closely adjacent thereto, and means to move the blades relative to the screen in a path parallel thereto, each blade having its width dimension inclined backwardly relative to the screen and having the portion of its trailing side adjacent the screen concavely curved whereby the movement of the blade relative to the screen produces a waste-removing suction at the concavely curved portion of the trailing side which removes from the screen any waste matter accumulating thereon.

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New Catalogues, Ass'n Reports, and Publications

Crane Co., Chicago—"How to Keep Your Plant Going Without Interruption" is the title of a new publication just put out by this company. This is the first of a series of folders, intended to help the users of piping materials get the maximum out of their equipment. Graphic explanations are used to give ideas on a wide variety of piping assemblies.

Fairway Laboratories, St. Louis, Mo.—A folder type publication has just been issued by this company, explaining the use of salt tablets as a means of preventing illness caused by heat and over exertion. The various sizes and types of dispensers used are also explained.

Fischer & Porter Co., Hatboro, Pa.—A new catalogue section (50-A), entitled "Electrically Operated Remote Indicating, Recording, and Integrating Rotometers," just issued, consists of 8 pages and is part of a 200-page catalogue being published by this company. The subject of this section is the Stabi-Temp induction coil which will give accurate readings in spite of wide temperature variations.

Harris-Seybold-Potter Co., Cleveland, Ohio—Two very interesting pieces of literature on offset printing were recently sent out by this company. The first, entitled "Your Next Move" deals with subjects such as; three basic methods of printing, the history of printing methods, the offset process, the advantages and application of offset, modern trends, etc. This information is supplemented by a large number of colorful illustrations, giving typical examples of offset printing. The second booklet, entitled "Planning for Offset" gives a comprehensive and detailed description of offset production. This booklet gives the necessary information, such as; the potential for offset, a chart for evaluating the offset market, plans for plant layout, etc., to formulate plans for installing offset.

Keystone Carbon Co., Inc., Saint Marys, Pa.—A new revised catalogue on Selflube Porous Bearings describes the properties and uses of these self-lubricating bearings and furnishes complete details on the correct method of installation. Many different shapes of these bearings are illustrated. Standard sizes for plain bearings, flanged bearings, and thrust bearings, are listed. The last two pages contain graphs showing the allowance on the bearings for press fit into housing, and the allowance running fit after insallation.

Link-Belt Co., Chicago—The new Bulk-Flo, a continuous flow system for loose-materials handling is discussed in detail in a new booklet (No. 1975) recently issued. The design and operating features of this system are carefully diagrammed and described to show its advantages, its flexibility, and its simplicity. Charts are included giving typical materials conveyed, the sizes, capacities, and the assemblies of the various sections with major dimensions. One entire section of the book is devoted to the engineering details of these conveyors.

Lyon Iron Works, Greene, N. Y.—A new booklet dealing with the Lyon Hydraulic lift truck has just been sent out. The various advantages of the hydraulic operation are listed and explained. Specification charts giving information on the different models as to size and weight capacity are included. The design and construction of the lift are shown in a large illustration of the lift demounted.

D. J. Murray Manufacturing Co., Wausau, Wis.—Comprehensive treatment is given to Grid Blast Coils in a 19-page catalogue recently published by this company. Detailed descriptive material and illustrations point out the differences between these coils and other types of unit heaters. Charts are used to show the space necessary for various size units. Eight pages are devoted to extensive cross-classification charts giving information on the velocity and temperature of sizes ranging from one blast unit to six blast units deep.

K. K. Porter Co., Inc., Pittsburgh—A new 28-page catalogue, describes a line of agitators, mixers, digesters, kettles, ball mills, and pebblemills for the process industries. Comprehensive specification tables are included with illustrations and explanation of each piece of equipment. One page is devoted to Porter Industrial Locomotives. Interesting information and tables relative to capacities of dished bottom tanks, weights of materials, volume, etc., are also included.

Swenson Evaporator Co., Harvey, Ill.—Very comprehensive treatment is given Swenson Long-Tube Vertical Evaporators in the first of a series of new catalogue bulletins (No. E-100) to be published by this company. This two-color booklet deals with the application, the construction, the heating element, the separation of liquid and vapor, the fabrication, and the economy of these evaporators. One-half page is devoted to a labeled diagram and descriptive material on the principle of operation. A two-page spread illustrates a typical arrangement of a Backward Feed 6-body Quintuple Effect L.T.V. Evaporator with condensate and liquor flash systems together with three smaller typical flow sheets illustrating the use of Swenson Evaporators.

Truscon Laboratories, Detroit, Mich.—Paratex, a new rubber base steel coating, is discussed in a folder recently published by this company. This coating is used to protect iron, steel, aluminum, copper, and galvanized metal. The advantages together with the numerous applications are described in detail. Illustrations show how this coating has protected an exposed steel roof for one and one-half years, and another shows what happens to unprotected steel pipes where moisture is present.

Worthington Pump and Machinery Corp., Harrison, N. J.—A new publication has just been sent out dealing with the subject of the type U centrifugal pumps. Labeled cross-cut illustrations together with a listing of the specifications, and labeled diagrams are used to give a clear picture of the advantages and functions of these pumps. One page is given to a line drawing showing the dimensions of the pumps.

Books

Lessons in Arc Welding (Second Edition)—Published by The Lincoln Electric Co., Cleveland, Ohio, this book covers a series of 60 lessons which present, in concise manner, fundamental facts about welding. Text explanations are supplemented by line drawings and photos for ready understanding. A valuable feature of the book is a set of questions and answers for each lesson. The book, bound in semi-flexible simulated leather, contains 176 pages, 6 x 9 inches. The price, quoted by the publisher, is 50 cents per copy, postpaid anywhere in the United States, 75 cents elsewhere.

Abbreviations for Scientific and Engineering Terms (Revised Edition)—This publication has been developed by a group of engineers, editors, and scientists representing a number of national organizations. The chief difference in this edition from its predecessor is the inclusion of abbreviations for terms not previously covered, and the shortening of certain previously recommended abbreviations. Other characteristics of the standard are: elimination of spaces between word combinations or letters; and elimination of periods except in cases where the abbreviation spells out a common English word. Another important change is in abbreviations for units in the temperature scales. Published in pamphlet form, the publication may be obtained from the American Standards Association, 29 West 39th St., New York, N. Y. The price is 35 cents a copy.

Statistical Abstract of the United States 1940 (Sixty-Second Number)—This annual volume is a compilation of more than 900 pages of statistics relating to the social and economic condition of the population and to the industrial, commercial, and governmental activities of the Nation. It was prepared in the Division of Territorial, Insular, and Foreign Statistics, of the Bureau of the Census, under the supervision of Kathleen H. Dugan, editor, and under the administrative direction of LeVerne Beales, Chief Statistician for the Division. The tables cover a wide range of subjects, many of them presenting figures from the earliest available dates. Bound in buckram, the book is priced at $1.50 a copy. It may be purchased from the Superintendent of Documents, Washington, D. C.

The Chemistry of Pulp and Paper Making (Third Edition)—The first two editions of this book were the work of Edwin Sutermeister; the present edition, of Mr. Sutermeister and a number of collaborators. The first edition appeared in 1920; the second, in 1929; and the third, in May, 1941. In general, the chapter arrangement of the third edition is similar to the previous editions. The chapter on the sulphate process, however, precedes the chapter on the soda process; and a chapter covering moisture relations of pulp and paper has been added. Mr. Sutermeister personally contributed the chapters on Fibrous Raw Materials, Miscellaneous Pulping and Pulp Treating Processes, Water, Testing Wood Pulp, Paper Testing, Printing, and Moisture Relations of Pulp and Paper. The chapters on Rags and Non-Woody Materials, The Soda Process, Coloring, and Coated Papers were handled jointly by Mr. Sutermeister with other contributors: H. W. Bialkowsky, for the first; R. T. Greep, for the second; and A. S. Prince, for the latter two. The remaining chapters and their respective authors are as follows: Cellulose, by Harry F. Lewis and Herbert L. Davis; The Sulfate Process, by Paul Hodges; The Sulfite Process, by C. E. Curran and G. H. Chidester; Groundwood, by H. J. Rowley; Bleaching, by John D. Rue; Sizing, by R. M. K. Cobb; and Loading and Filling, by A. E. H. Fair.

The price of the book is $6.50 a copy; the publisher, John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y.

Macromolecular Compounds. 239. Structure of Wood Polyoses—Designated as Cellulose Translation No. 4, this work is a translation by Julian F. Smith of an article by E. Husemann in the *Journal fur Praktische Chemie* 155, 13-64 (1940). It relates to the occurrence, chemical structure, properties, derivatives and potentional uses of the pentosans and hexasans in wood and straw pulps (xylans, mannans, arabans, galactans, arabogalactans and the like). The translation, reproduced by liquid duplicator on white bond paper (8½ in. x 11 in.) is unbound

and consists of 43 pages of material. The price of the translation is $1.90 a copy; the source, Hooker Scientific Library, Central College, Fayette, Missouri.

Some Aspects of Printing, Old and New—In his foreword Daniel Berkeley Updike, the author of this volume, states in part that "These papers owe their origin chiefly to an invitation of Mr. Philip Hofer, head of the Department of Printing and Graphic Arts at Harvard University, to address the Friends of the Harvard Library in Cambridge. And he adds, "I have called the very 'mixed bag' here presented 'Some Aspects of Printing, Old and New,' as that happens to be just what it is—papers tied together by a general subject treated from a number of angles." The papers include: Gutenberg and His Relation to Printers Today; The Essentials of a Well-Made Book; Some Tendencies in Modern Typography; The Place of the Educated Man in the Printing Industry; and American University Presses. The page size is 7⅝ x 10⅛ inches; the type, English monotype-Times Roman; the paper, special white wove Archer; and the binding, gray Bancroft cloth over boards, with title stamped in gold.

The price of the book is $3.00 a copy; the publisher, William Edwin Rudge, P. O. Box 1893, New Haven, Conn.

Association Reports

National Defense—Chlorine—On July 10, E. W. Tinker, executive secretary of the American Paper and Pulp Association sent to all members a condensation of the proceedings of the Open Meeting of the Association held in New York June 18, 1941. This meeting was specifically concerned with the chlorine situation as it pertains to the paper and pulp industry and the National Defense Program. Mr. Tinker states that in the three weeks which have elapsed since the meeting was held representatives of the Army and Navy inform them that the chlorine problem confronting the nation has become very acute, and that there is a far greater chlorine requirement in the defense program than previously indicated. He goes on to say that the Association has been informed of further curtailed consumption of chlorine, civilian or non-defense. In order that there may be no serious disruption of operations, mills are urged to make a thorough survey to determine in what way they may further curtail their chlorine consumption, if and when it becomes necessary.

Newsprint Statistics—June production figures, released by the News Print Service Bureau on July 10, state that production in Canada during June, 1941, amounted to 273,697 tons and shipments to 281,843 tons. Production in the United States was 83,962 tons and shipments 85,424 tons, making a total United States and Canadian newsprint production of 357,659 tons and shipments of 367,267 tons. During June, 29,603 tons of newsprint were made in Newfoundland, so that the total North American production for the month amounted to 387,262 tons. Total production in June, 1940, was 430,367 tons.

The Canadian mills produced 20,853 tons less in the first six months of 1941 than in the first six months of 1940, which was a decrease of 1.3 per cent. The output in the United States was 6,125 tons or 1.2 per cent more than in the first six months of 1940; in Newfoundland production was 4,211 tons or 2.5 per cent more, making a net decrease of 10,517 tons, or .5 of one per cent less than in the first six months of 1940.

Stocks of newsprint paper at the end of June were 165,898 tons at Canadian mills and 12,065 tons at United States mills, making a combined total of 177,963 tons compared with 187,571 tons on May 31, 1941, and 198,112 tons at the end of June, 1940.

THE BEAR FACTS OF A LUMBER CAMP

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CURRENT MARKET QUOTATIONS

RAGS (Domestic)
f. o. b. New York City

NEW RAGS

	per cwt.
Blue Overalls	4.75 to 5.00
Corduroy	2.50 to 2.75
Cottons—	
Washables, No. 1	2.10 to 2.25
Fancy Percales	3.50 to 3.75
New Soft Blacks	3.25 to 3.50
New Light Seconds	1.90 to 2.00
New Dark Seconds	1.65 to 1.75
Khaki Cuttings—	
Mixed	2.50 to 2.75
O. D.	3.00 to 3.25
New White Canvas	7.50 to 8.00
New Mixed Blacks	2.50 to 2.75
Shirt Cuttings	
New White No. 1	6.50 to 6.75
Silesias No. 1	4.50 to 4.75
New Unbleached	6.50 to 6.75
Fancy	2.50 to 2.75
Linen Cuttings—	
White	12.50 to 13.00
Grey	12.00 to 12.50

RAGS (Domestic)
f. o. b. New York City

OLD RAGS

	per cwt.
Roofing—	
No. 1	1.40 to 1.50
No. 2	1.05 to 1.15
No. 3	.95 to 1.00
Twos and Blues—	
Repacked	1.75 to 2.00
Thirds and Blues—	
Repacked	1.40 to 1.60
Miscellaneous	1.20 to 1.35
Whites, No. 1—	
Repacked	3.25 to 3.75
Miscellaneous	2.75 to 3.00
Whites, No. 2—	
Repacked	2.50 to 2.75
Miscellaneous	2.00 to 2.25

RAGS (Foreign)
ex dock New York City

NEW RAGS — per cwt. — Nominal

New Dark Cuttings
New Mixed Cuttings
New Light Silesias
Light Flannelettes
Unbleached Cuttings
New White Cuttings
New Light Oxfords
New Light Prints

RAGS (Foreign)
ex dock New York City

OLD RAGS — per cwt. — Nominal

No. 1 White Linens
No. 2 White Linens
No. 3 White Linens
No. 4 White Linens
No. 1 White Cottons
No. 2 White Cottons
No. 3 White Cottons
No. 4 White Cottons
Extra Light Prints
Ord. Light Prints
Med. Light Prints
Dutch Blue Cottons
French Blue Cottons
French Blue Linens
Checks and Blues
Linsey Garments
Dark Cottons
Old Shoppers

ROPE and BAGGING
f. o. b. and ex dock New York City

Gunny No. 1—	per cwt.
Foreign	Nominal
Domestic	4.50 to 4.75
Wool Tares—	per cwt.
Light	4.00 to 4.25
Heavy	4.25 to 4.50
No. 1 Scrap Bagging	4.00 to 4.25
Manila Rope—	
Foreign	6.00 to 6.25
Domestic	6.00 to 6.25
New Burlap Cuttings	4.75 to 5.00
Jute Threads—	
Foreign (Nom.)	6.00 to 6.50
Domestic	5.50 to 6.00
Strings—	
Sisal	3.25 to 3.50
Soft jute	4.00 to 4.25
Mixed	1.25 to 1.50

WASTE PAPER
f. o. b. New York City

Shavings—	per cwt.
White Envp. Cuttings	3.40 to 3.60
Ord. Hard White No. 1	2.60 to 2.85
Ord. Soft White No. 1	2.40 to 2.60
Soft White, Extra	3.00 to 3.25
Flat Stock—	
Stitchless	1.55 to 1.65
Overissue Mags	1.40 to 1.50
Solid Flat Book	1.30 to 1.40
Crumpled No. 1	1.20 to 1.30
Solid Ledger Books	2.15 to 2.25
Ledger Stock—	
White	1.75 to 1.85
Colored	1.50 to 1.65
New B. B. Chips	.60 to .65
Manilas—	
New Env. Cuts	2.85 to 3.00
New Cuttings	2.00 to 2.25
Sulphite Mill Wrappers	.60 to .70
No. 1 Old Kraft	1.60 to 1.75
Old Corrugated Boxes	.82½-
News—	
No. 1 Wh. News Cuttings	1.60 to 1.75
Strictly Overissue	.75 to .80
Strictly Folded	.65-
No. 1 Mixed Paper	.57½-

CHEMICALS
f. o. b. shipping point

Alum (Papermakers)—	
Lump, cwt.	3.75-
Ground, cwt.	3.50-
Powdered, cwt.	3.90-
Blanc Fixe—	
Pulp, bulk, ton	35.00 to 42.00
Dry, barrels, pound	.0300 to .0400
Bleaching Powder—	
Drums, cwt.	2.00 to 3.00
Casein (Domestic Standard)—	
20-30 mesh (bags), lb.	22.00 to 23.00
80-100 mesh (bags), lb.	22.50 to 23.50
Argentine, lb.	21.50 to 22.00
China Clay—	
Domestic Filler	
Bulk (mine) ton	7.50 to 15.00
Domestic Coating	
Bulk (mine) ton	12.00 to 22.00
Imported (ship side)	
Bulk (lump) ton	15.00 to 26.00
Chlorine—	
Tank cars (wks) cwt.	1.75 to 1.90
Gelatine (silicin), lb.	.70 to .75
Glye. (C.P.) drums, lb.	.1450 to .1500
Litharge, powd., bbl., lb.	.08¼ to
Rosin (Gum)—	
New York, per 100 lbs.	
E	2.97-
F	2.97-
G	2.97-
WW	4.47-
Rosin (Wood), carlots	2.20-
Salt Cake—	
Dom. bulk (wks) ton	16.00 to 17.00
Imp. bulks on dock—	
(Atl. ports) ton (Nom.)	20.00 to
Soda Ash—	
Bulk (works), cwt.	.90 to .95
Paper Bags, cwt.	1.05 to 1.35
Barrels, cwt.	1.05 to 1.35
Soda (Caustic)—Ammonia,	
Solid, drums, cwt.	2.30 -
Ground and flaks, drums, cwt.	2.70 -
Sodium Silicate—	
60 deg., 55 gal. drums, (works) cwt.	1.65 to 2.00
40 deg., 35 gal. drums, (works) cwt.	.80 to 1.45
Starch—	
Pearl, 140 lb. bags, cwt.	3.10-
Pearl, barrels, cwt.	3.20-
Paper (Sp.) bags, cwt.	3.20-
barrels, cwt.	3.30-
Sulphur (crude)—	
(mine) bulk, long ton	16.00 to 20.50
Talc—	
Dom. 100 lb. bags (mine) ton	15.00 to 20.00
Imp. bulk, ton (Nom.)	—
Titanium Dioxide—	
Barium Pig., bbls., lb.	.05¼ to .06
Calcium Pig., bbls., lb.	.05 to .05¼
Zinc Sulphide, bbls., lb.	.07¼ to .08

CHEMICAL PULP
(Air-dry ton)

	per cwt.
Soda (Dom.) del'd. mill—	
Bleached, contract	3.30 -
Open market	3.30 -
Sulphate (Dom.) f. o. b. mill—	
Bleached	4.25 to 4.50
Kraft No. 1	3.50 to 3.75
Kraft, Southern, del.	3.25 to 3.50
Sulphate (Imp.) on dock—	
Bleached	4.75 to 5.00
Kraft No. 1	3.75 to 4.00
Kraft No. 2	3.50 to 3.75
Sulphite (For.)	
On dock—	
Prime bleached	4.00 to 4.50
Prime easy bleach	3.90 to 4.15
Prime strong unbl.	3.50 to 3.75
Sulphite (Dom.)	
Bleached, contract	3.62½ -
Bleached, open market	3.85 -
Unbleached, contract	3.17½ -
Unbleached, open market	3.35 -

MECHANICAL PULP
(Air-dry ton)

	per ton
No. 1 Dom. & Can. (f. o. b. pulp mill)	31.00 to 34.00
No. 1 Imp. (On dock)—	
Moist	—
Dry	—

PAPER
f. o. b. New York City

Boards—	per ton
Binders	78.00 to 82.00
Chip	42.50-
Chip, sgl. mla. lined	57.50-
Coated, white patent	
.016	77.50-
.020 and heavier	72.50-
Kraft liner	65.00-
News	42.50-
Book (coated)	**per cwt.**
No. 1 Glossy Coat	11.90 to 12.50
No. 2 Glossy Coat	10.35 to 11.75
No. 3 Glossy Coat	9.55 to 11.00
No. 4 Glossy Coat	9.15 to 10.50
No. 2 Offset	7.95 to 10.25
A Grade Super	7.70 to 10.00
B Grade Super	7.25 to 9.50
Bonds (Rag Content)—	
100% Rag	per cwt.
Ext. No. 1	42.50 to 46.00
100% Rag	40.25 to 46.00
85% Rag	
75% Rag	26.65 to 27.75
65% Rag	
50% Rag	20.15 to 22.00
25% Rag	16.90 to 18.50
Regular Colors	1.00 cwt. extra
Bonds (Sulphite)—	**per cwt.**
No. 1	11.05 to 12.00
No. 2	10.10 to 11.00
No. 4	9.25 to 10.00
Colors	1.00 cwt. extra
Glassine (f. o. b. mill)—	**per cwt.**
Embossed (25 lb. up)	14.00 to 14.25
Bleached (25 lb. up)	12.75 to 13.00
Unbleach. (25 lb. up)	11.50 to 12.00
Greaseproof—	
Bleach. (25 lb. up)	10.75 to 11.00
Unbleach. (25 lb. up)	10.00 to 10.25
Ledgers (Rag Content)—	
100% Rag	per cwt.
Ext. No. 1	40.25 to 47.25
100% Rag	32.20 to 37.75
85% Rag	29.90 to 35.00
75% Rag	24.75 to 29.00
65% Rag	21.45 to 26.25
50% Rag	18.70 to 22.75
25% Rag	15.80 to 19.25
Regular Colors	1.00 cwt. extra
Ledgers (Sulphite)—	**per cwt.**
No. 1	12.25 to 13.50
No. 2	9.25 to 11.25
No. 4	8.50 to 10.25
News—	**per ton**
Rolls (Contract)	49.00 to 50.00
Rolls (Spot)	(nominal)
Sheets	58.00 -
Tissues (Carlots)—	**per ream**
White, No. 1	.97½ -
White, No. 2	.75 to .77½
Anti-Tarnish M. G.	.80 to 1.05
Colored	.87½ to 1.10
Kraft	.85 to .90
Manila	.77½ to .80
Napkins, semi-crepe (12¾ lb. to M shts.) per ea	.46 -
Napkins, full crepe and emb'sed (12¾ lb. to M shts.) per ea.	.48 -
Toilet, Bleached (M shts.) per ea	5.80 -
Toilet, Unbleached (M shts.) per ea	3.50 -
Towels—	**per case**
Bleached	3.10 to 3.65
Unbleached	1.95 to 3.30
Wrappings (Kraft)—	**per cwt.**
Extra Quality	5.50 to 6.00
Super-Standard	4.87½ to 5.50
Northern Standard	4.50 to 5.00
Southern Standard	4.50 to 5.00
Wrappings (Sulphite and Bleached Kraft)— (Rolls, f. o. b. mill)	
Bleached papers—	**per cwt.**
M.F.& M.G. Waxing, 20 lb. (Carloads only)	7.00 to 7.25
(10,000 lbs.)	7.25 to 7.50
Drug wrapp. 25 lb.	6.50 to 6.75
Unbleached Papers—	
Com. Grd. Butch. 40 lb.	4.87½ to 5.12½
No. 1 Butchers	5.50 to 5.75
No. 1 Imit. Parch & Dry Fin.Groe.Sulphite 30 lb.	6.00 to 6.25
No. 2 Imit. Parch & Dry Fin.Groe.Sulphite 20 lb.	5.62½ to 5.87½
Steam Finish, 50 lb.	4.50 to 4.75
Water Finish, 40 lb.	4.87½ to 5.12½
Manilas—	
Envp. Mla., Sub. 16-40 (No. 1)	5.50 to 5.75
Envp. Mla., Sub. 16-28 (No. 2)	5.25 to 5.50
Envp. Mla. (Prices based on large sheets untrim'd reammarked, in bdls.)	
Wrapp. Mla. 35 lb. up—	
No. 1	5.75 to 6.00
No. 2	5.50 to 5.75
M. G. Sulphite and Kraft (other than Waxing)	
Grade A-35 lb.	6.25 to 6.50
Grade B-35 lb.	6.00 to 6.12½